



RECREATION SOILS-WATER TIMBER-WILD- LIFE-MINERAL



FINAL
ENVIRONMENTAL
IMPACT STATEMENT

PHOSPHATE LEASING
ON THE OSCEOLA
NATIONAL FOREST
FLORIDA



U.S. DEPARTMENT OF THE INTERIOR

880 13709

BLM Library
D-553A, Building 50
Denver Federal Center
P. O. Box 25047
Denver, CO 80225-0047

DEPARTMENT OF THE INTERIOR
(Int. FES 74-37)

OSCE
FES
TD
195
.p45
082
1974

FINAL
ENVIRONMENTAL STATEMENT

PHOSPHATE LEASING
on the
OSCEOLA NATIONAL FOREST
in
FLORIDA

Prepared by

EASTERN STATES OFFICE
Bureau of Land Management
Department of the Interior

Carl Bertland

Director, Bureau of Land
Management

Bureau of Land Management
Library
Bldg. 50, Denver Federal Center
Denver, CO 80225

SUMMARY

(X) Final Environmental Statement

Department of the Interior, Bureau of Land Management, Eastern States Office

1. Type of action: (X) Administrative () Legislative

2. Brief description of action:

The action under consideration is the proposed issuance of 41 phosphate preference right leases on 52,000 acres of the Osceola National Forest, north central Florida.

3. Summary of environmental impact and adverse environmental effects:

Issuance of these leases would result in surface mining approximately 30,000 acres of the forest. This mining would result in the permanent removal of the 120,000,000 tons of phosphate rock over a period of approximately 30 years. Six endangered wildlife species would have their habitat temporarily or permanently removed. Between 10,000 to 14,000 acres of private land would be under slime ponds. Approximately 9,000 acres of the forest would be converted to lakes and ponds.

4. Alternatives:

A. Delay Action

(1) No Action

(2) Delay Decision on Leasing

B. Issuance of leases

(1) Issuance of all the preference rights leases

(2) Selective leasing to protect sensitive areas

(3) Leasing with delayed authorization to mine

(4) Purchase of mitigating lands

C. Deny the issuance of leases

(1) Cash payment

(2) Mineral exchange

D. Alternate sources or reduction of the use of phosphate

(1) Reduce consumption of phosphate

(2) Reduce exports and reallocate existing supplies

(3) Increase production from existing sources or import phosphate

(4) Development of mines

(5) Phosphate recycling

(6) Existing slimes

(7) Substitute sources

5. Comments on the draft statement were requested from the agencies listed on the reverse side. Those who commented are indicated by an asterik.

6. Draft made available to CEQ and the Public:

Draft Statement: December 12, 1973

Final Statement: June 27, 1974

FES Reprinted: November 1978

Federal

* Environmental Protection Agency

Department of Agriculture

- * U.S. Forest Service
- * Soil Conservation Service

Department of Defense

Department of the Army - Corps of Engineers

Department of the Interior

- * Geological Survey
- * Bureau of Mines
- * Bureau of Outdoor Recreation
- * U.S. Fish and Wildlife Service
- * Bureau of Land Management

Department of Transportation

Federal Highway Administration

State of Florida

State Clearinghouse

- * Bureau of Planning, Department of Administration

TABLE OF CONTENTS

	Page
Summary of the Action Under Consideration-----	i
Table of Contents-----	iii
List of Tables-----	v
List of Figures-----	v
List of Photographs-----	vi
 I. DESCRIPTION OF THE ACTION UNDER CONSIDERATION-----	I-1
A. Action Under Consideration-----	I-1
B. Phosphate Leasing Procedures-----	I-1
1. Authority-----	I-1
2. Administration-----	I-4
C. History of the Cases-----	I-4
1. Background-----	I-4
2. Application for BLM Prospecting Permits-----	I-6
3. Application for Preference Right Leases-----	I-6
D. Phosphate in the Local, Regional and National Economy: A Supply and Demand Forecast-----	I-6
E. Description and Quantification of the Phosphate Operations-----	I-9
1. Assumptions-----	I-9
2. Overview of the Operation-----	I-12
3. Mining Methods-----	I-12
4. Reclamation Methods-----	I-16
5. Process Descriptions-----	I-18
6. Process Waste Characterization-----	I-26
7. Additional Process Control-----	I-30
F. Relationship of Considered Action to National Forest Land Use Plans, Policies, and Controls-----	I-32
1. Osceola National Forest Plans-----	I-32
2. Suwannee River RC&D Plans-----	I-33
3. State Multi-County Planning-----	I-34
 II. DESCRIPTION OF THE ENVIRONMENT-----	II-1
A. Non-Living Components-----	II-1
1. Geology-----	II-1
2. Mineral Resources-----	II-1
3. Soils-----	II-8
4. Water Resources-----	II-9
5. Climate and Air Quality-----	II-22
B. Living Components-----	II-29
1. Vegetation-----	II-29
2. Wildlife and Fisheries-----	II-38
3. Forage-----	II-40
4. Timber-----	II-41
5. Recreation-----	II-42
6. Land Uses and Improvements-----	II-42
7. Human Population Patterns and Considerations-----	II-44
C. Aesthetics-----	II-45
D. Historic and Archaeological Values-----	II-45
E. Highly Sensitive Areas-----	II-47
 III. ENVIRONMENTAL IMPACTS-----	III-1
A. Non-Living Components-----	III-1
1. Geology-----	III-1
2. Mineral Resources-----	III-1
3. Soils-----	III-2
4. Water Resources-----	III-3
5. Climate and Air Quality-----	III-6
B. Living Components-----	III-7
1. Vegetation-----	III-7
2. Wildlife and Fisheries-----	III-8
3. Forage-----	III-9
4. Timber-----	III-9
5. Recreation-----	III-10
6. Land Uses and Improvements-----	III-10
7. Human Population Patterns and Considerations-----	III-11
C. Aesthetics-----	III-11
D. Historical and Archaeological Values-----	III-12
E. Highly Sensitive Areas-----	III-12
 IV. MITIGATING MEASURES-----	IV-1
A. Non-Living Components-----	IV-1
1. Geology-----	IV-1
2. Mineral Resources-----	IV-1
3. Soils-----	IV-1

TABLE OF CONTENTS (Cont'd)

	Page
4. Water Resources-----	IV-2
5. Climate and Air Quality-----	IV-3
B. Living Components-----	IV-4
1. Vegetation-----	IV-4
2. Wildlife and Fisheries-----	IV-4
3. Forage-----	IV-5
4. Timber-----	IV-5
5. Recreation-----	IV-5
6. Land Uses and Improvements-----	IV-5
C. Aesthetics-----	IV-5
D. Historical and Archaeological Values-----	IV-5
E. Stipulations-----	IV-5
V. ADVERSE IMPACTS THAT CANNOT BE AVOIDED-----	V-1
A. Non-Living Components-----	V-1
1. Geology-----	V-1
2. Mineral Resources-----	V-1
3. Soils-----	V-1
4. Water Resources-----	V-1
5. Climate and Air Quality-----	V-1
B. Living Components-----	V-1
1. Vegetation-----	V-1
2. Wildlife and Fisheries-----	V-2
3. Forage-----	V-2
4. Timber-----	V-2
5. Recreation-----	V-2
6. Land Uses and Improvements-----	V-2
C. Aesthetics-----	V-2
D. Historical and Archaeological Values-----	V-2
VI. SHORT-TERM USES VERSUS LONG-TERM PRODUCTIVITY OF THE AREA-----	VI-1
A. Soil-----	VI-1
B. Water Resources-----	VI-1
C. Climate and Air Quality-----	VI-1
D. Vegetation and Forage-----	VI-1
E. Wildlife and Fisheries-----	VI-1
F. Timber-----	VI-2
G. Recreation-----	VI-2
H. Aesthetics-----	VI-2
I. Land Uses-----	VI-2
VII. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES-----	VII-1
A. Depletion of Mineral Resources-----	VII-1
B. Landform Changes-----	VII-1
C. Commitment of Mineral Resources-----	VII-1
D. Soils-----	VII-1
E. Vegetation-----	VII-1
F. Fish and Wildlife Habitat-----	VII-1
G. Timber-----	VII-2
H. Aesthetics-----	VII-2
I. Historical and Archaeological Values-----	VII-2
VIII. ALTERNATIVES-----	VIII-1
A. Delay Action-----	VIII-1
1. No Action-----	VIII-1
2. Delay Decision on Leasing-----	VIII-1
B. Issuance of Leases-----	VIII-1
1. Issuance of All the Preference Rights Leases-----	VIII-1
2. Selective Leasing to Protect Sensitive Areas-----	VIII-1
3. Leasing With Delayed Authorization to Mine-----	VIII-1
4. Purchase of Comparable Lands-----	VIII-2
C. Deny the Issuance of Leases-----	VIII-2
1. Cash Payment-----	VIII-2
2. Mineral Exchange-----	VIII-2
D. Alternate Sources or Reduction of the Use of Phosphate-----	VIII-2
1. Reduce Consumption of Phosphate-----	VIII-2
2. Reduce Exports and Reallocate Existing Supplies-----	VIII-2
3. Increase Production from Existing Sources or Import Phosphate-----	VIII-2
4. Development of Offshore Deposits-----	VIII-2
5. Phosphate Recycling-----	VIII-2
6. Existing Slimes-----	VIII-3
7. Substitute Sources-----	VIII-3
E. Lands Exchange-----	VIII-3
F. Legislation-----	VIII-3

TABLE OF CONTENTS (Cont'd)

	<u>Page</u>
IX. CONSULTATION AND COORDINATION WITH OTHERS-----	IX-1
A. Consultation and Coordination in the Development of the Proposal and in the Preparation of the Draft Environmental Statement-----	IX-1
1. Agencies, Groups, and Individuals-----	IX-1
2. Other Consultation and Coordination-----	IX-1
B. Coordination During Review of the Draft Environmental Statement-----	IX-1
1. Distribution and Comments (requested)-----	IX-1
2. Written Comments Received-----	IX-1
3. Public Hearings-----	IX-1
4. Summary of Public Response-----	IX-2
5. Summary of Issues-----	IX-2
6. Response to and Disposition of more Specific Issues-----	IX-3
7. Written Comments (letters attached)-----	IX-13
X. GLOSSARY-----	X-1
XI. MAPS-----	XI-1
XII. APPENDIX-----	XII-1

LIST OF TABLES

<u>No.</u>	<u>Page</u>
1. Headwater Streams in Suwannee - St. Marys River Basin on Forest Service Land-----	II-15
2. Osceola National Forest Water Quality Background Data-----	II-18
3. Well Water Quality at Ocean Pond-----	II-19
4. Climatological Summary-----	II-28
5. Prevailing Wind Direction-----	II-30
6. Fish Composition - Suwannee River-----	III-9
A. Geography and Environment-----	Appendix 7
B. Population Change-----	Appendix 7
C. Population Projection-----	Appendix 7
D. Health Facilities-----	Appendix 7
E. Public Assistance Payments-----	Appendix 7
F. Average Electric Bills-----	Appendix 7
G. Housing Information-----	Appendix 7
H. Housing Units-----	Appendix 7
I. Farm Characteristics-----	Appendix 7
J. Commercial Forest Land-----	Appendix 7
K. Value Farm Products and Pulpwood-----	Appendix 7
L. Non-Agriculture Employment-----	Appendix 7
M. Civilian Labor Force-----	Appendix 7
N. Per Capita Income-----	Appendix 7

LIST OF FIGURES

<u>No.</u>	<u>Page</u>
1. Known Mineable Phosphate Deposits-----	I-2
2. Mining Lease Applications-----	I-3
3. U.S. Phosphate Deposits-----	I-5
4. U.S. Phosphate Trends-----	I-7
5. Phosphate Supply-Demand Forecast-----	I-8
6. Phosphate Export-Demand Forecast-----	I-10
7. Mining Layout Not Considering Reclamation-----	I-19
8. Mining Layout Considering Reclamation-----	I-19
9. Phosphate Deposits of Eastern U.S.-----	II-2
10. Geologic Structures of Georgia-Florida Phosphate-----	II-3
11. Geologic Map of Florida-----	II-4
12. Subsurface Geology, Description of Formations-----	II-5
13. Subsurface Geologic Stratigraphy-----	II-6
14. Overburden and Matrix-----	II-7
15. River Basin Map of Florida-----	II-11
16. Suwannee - St. Marys Basin-----	II-12
17. East-West Ridge-----	II-13
18. Flood Discharge and Drainage Area-----	II-17
19. Geologic Units and Their Water Bearing Characteristics-----	II-21
20. Potentiometric Surface - Columbia County-----	II-23
21. Potentiometric Surface - Baker County-----	II-24
22. Groundwater Recharge Areas - Columbia County-----	II-25
23. Potentiometric Surface - Northeast Florida-----	II-26
24. Groundwater Recharge Areas - Northeast Florida-----	II-27
25. Number of Times Destruction was Caused by Tropical Storms 1901-1955-----	II-32

LIST OF PHOTOGRAPHS

No.		Page
1.	Exploratory Drilling Operation Portable Drilling Rig-----	I-13
2.	Exploratory Drilling Crew Core Removal for Sampling-----	I-13
2.1	Access Road Through Osceola National Forest-----	I-14
2.2	Forest Site Cleared Prior to Mining Operations-----	I-14
3.	Typical Dragline Operation-----	I-15
4.	Stripping Overburden-----	I-15
5.	Slurry Operation High Pressure Nozzles-----	I-17
6.	Slurry Operation Suction Pump to Plant-----	I-17
7.	Central Florida - Phosphate Mine Prior to Reclamation-----	I-20
8.	Central Florida - Area Shown in Fig. 7 Shortly After Reclamation-----	I-21
9.	Mined Area Before Reclamation-----	I-22
10.	Partially Reclaimed Area Central Florida-----	I-22
11.	Reclaimed Area - Water Body Approximately 10 Years After Mining-----	I-23
12.	Reclaimed Area in Foreground Light Agricultural Use-----	I-23
13.	Pine Flatwoods - Longleaf Phase - Osceola National Forest-----	II-33
14.	Pine Flatwood Type - Slash Pine Phase - Osceola National Forest-----	II-33
14.1	Typical Pine - Flatwoods - Osceola National Forest-----	II-34
14.2	Deep Creek - A Major Drainage - Osceola National Forest-----	II-34
15.	Cypress Swamp Type - Baldcypress Blackgum Phase - Osceola National Forest-----	II-36
16.	Cypress Swamp Type - Pondcypress Phase - Osceola National Forest-----	II-37
17.	Creek Swamp Type - Osceola National Forest-----	II-37
18.	Aquatic Community - Osceola National Forest-----	II-39
19.	A "Macro" (Large) Landscape-----	II-46
20.	A "Micro" (Small) Landscape-----	II-46

I. DESCRIPTION OF THE ACTION UNDER CONSIDERATION

A. Action Under Consideration

HOLDERS OF PHOSPHATE PROSPECTING PERMITS HAVE APPLIED FOR PHOSPHATE PREFERENCE RIGHT LEASES ON 52,000 ACRES IN THE OSCEOLA NATIONAL FOREST IN NORTHERN FLORIDA. ISSUANCE OF THE LEASES WOULD AUTHORIZE EXTRACTION OF PHOSPHATE ORE BY SURFACE MINING METHODS.

The purpose of this statement is to identify the environmental impacts which would result from the issuance of the proposed leases. Phosphate prospecting permits were issued in the Osceola National Forest. Exploratory drilling has indicated workable deposits on approximately 28,000 acres, consisting of 23,500 acres on the permitted lands and 4,500 acres adjacent thereto. The 52,000 acres under permit represents approximately 34 percent of the Osceola National Forest. (Figure 1) The 28,000 acre deposit on the Osceola National Forest is a portion of a larger deposit, two thirds of which is on adjoining private lands. These private lands are owned by several companies including Occidental Petroleum Corporation which is currently operating a phosphate mining operation approximately eight miles west of the Forest boundary.

The discovery of valuable deposits of phosphates under the authorization of a prospecting permit entitles the permittee to a preference right mineral lease under such conditions as the Secretary of the Interior deems proper. Mineral leases on National Forests are administered by the Department of the Interior.

Applicants for the preference right leases are Pittsburg and Midway Coal Mining Company, Monsanto Chemical Products Company, Kerr-McGee Chemical Corporation, and Global Exploration and Development Corporation (Figure 2).

Identification of the environmental impacts requires the development of a reasonable projection or concept of the mining and processing operations. This is done on the basis of information gathered from companies and other sources. The remainder of Section I is intended to provide the reader with detailed information that is considered essential in identifying and evaluating impacts of the action under consideration.

B. Phosphate Leasing Procedures

1. Authority (Laws, Regulations and Policies)

Phosphate deposits located on public domain lands are leased under the authority of the Mineral Leasing Act of 1920, 30 U.S.C. sec. 181 et seq. and the Mineral Leasing Act of 1947 for Acquired Lands, 30 U.S.C. sec. 351-359. Forty acres of the lands of the Osceola under permit are public domain land and are subject to the Mineral Leasing Act of 1920. The remainder are subject to the Mineral Leasing Act of 1947.

The Secretary of the Interior may make rules and regulations necessary to carry out the provisions of the "Mineral Leasing Act for Acquired Lands" as well as the Mineral Leasing Act of 1920.

If prospecting or exploratory work is necessary, a phosphate permit for a maximum area of 2,560 acres per permit may be issued for a period of two years and extended for an additional four years. The issuance of the permit gives the permittee the exclusive right to prospect for phosphate and associated minerals. Discovery entitles the permittee to a lease for any or all of the lands embraced in the permit, 30 U.S.C. sec. 211(b).

Known mineral deposits including phosphate are subject to disposition only by leasing to qualified applicants if in the judgment of the Secretary the public interest will be served thereby, 30 U.S.C. secs. 211, 352. Such leasing may be by advertisement, competitive bidding or any other methods prescribed by regulation, in compact units not to exceed 2,560 acres. The leases are issued for a term of 20 years and as long thereafter as the lessee complies with the terms of the lease. At the end of the 20-year period, the Secretary may readjust the terms, 30 U.S.C. sec. 212.

Leasing of a particular tract of Federal lands under the 1920 Act is discretionary with the Secretary of the Interior, 30 U.S.C. sec. 211(a), but with respect to acquired lands (1947 Act), consent of the head the agency having administrative jurisdiction over the lands must be obtained. That agency head, in this case the Chief of the Forest Service, USDA, may require that the lease be made subject to certain conditions to insure use of the lands for the purpose for which they were acquired, 30 U.S.C. sec 352.

All leases are conditioned upon payment of specified royalties and rentals to the United States. The amount of these royalties shall be fixed by the Secretary in advance of offering the leases. The royalties specified in the leases may not be less than five percent of the gross value of the output. Each lease must also provide for payment of an annual rental, payable at the beginning of the lease year, of not less than 25 cents per acre for the first year, 50 cents per acre for the second and third year, and one dollar per acre for each year thereafter. Rental is credited against royalties as they accrue during the lease year. Failure to comply with the lease terms is a basis for termination of the lease by court action.

Each lease must contain provisions to insure exercise of care and diligence in operation of the leasehold and also certain provisions relating to health and safety, 30 U.S.C. sec. 187.

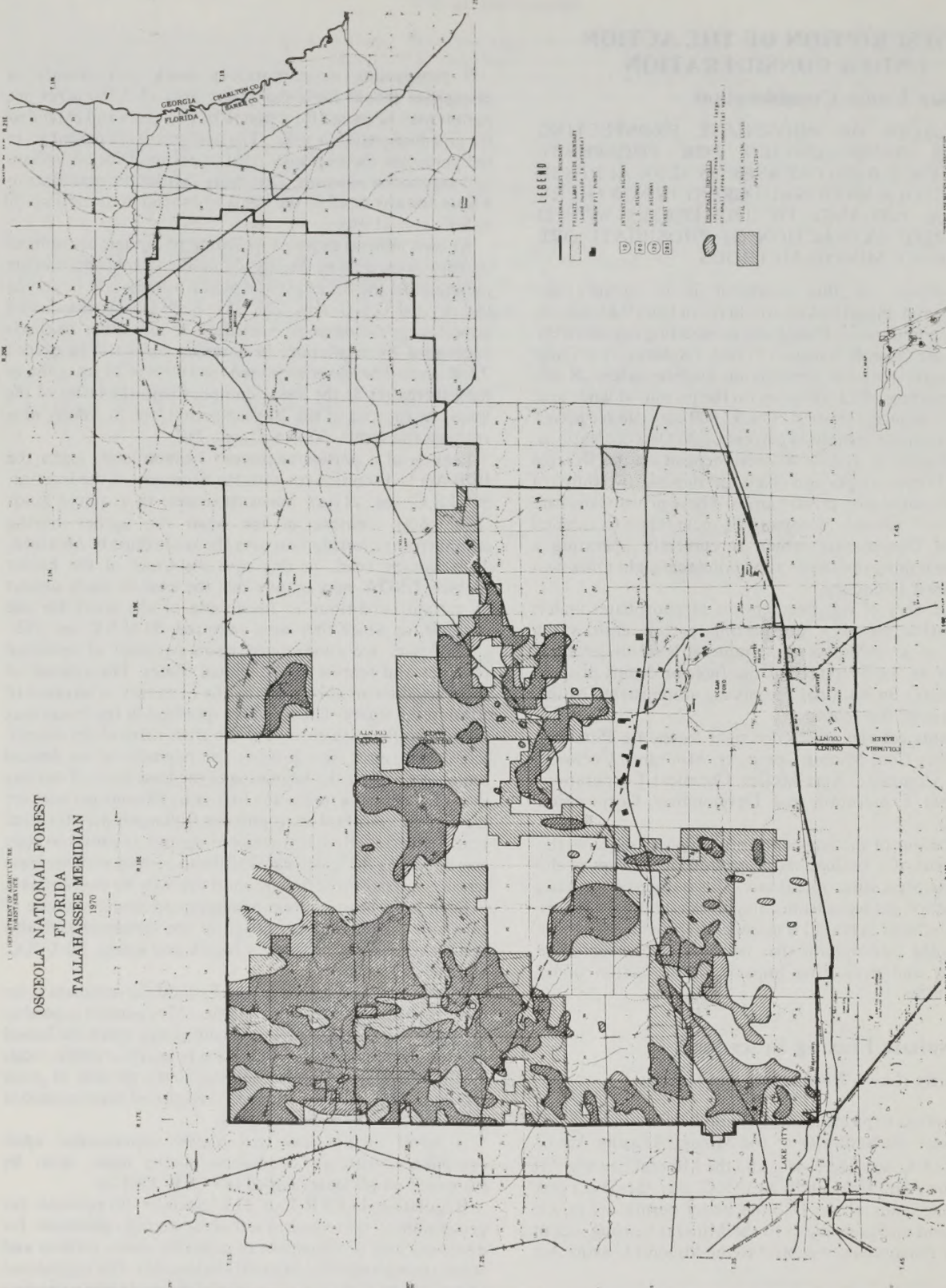
Of the monies received by the Federal Government from lease bonuses, rentals and royalties, 37½ percent is paid to the State for distribution to the counties in which the leased lands are located. These funds must be used for public roads and public education. An additional ten percent of gross receipts is appropriated for construction and maintenance of National Forest roads and trails.

A bond of not less than \$5,000, conditioned upon compliance with all conditions of the lease, must be furnished on all leases issued (43 CFR 3504.2).

Regulation 43 CFR Part 23 (Appendix 10) provides for protection of non-mineral resources during operations for discovery and development of minerals under permits and leases issued under the Mineral Leasing Act. The regulations require that a technical examination be made of prospective surface exploration and mining operations and that, based on the examination, requirements be included in the lease or permit to assure protection of non-mineral resources and the environment. When the lands are administered by another

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

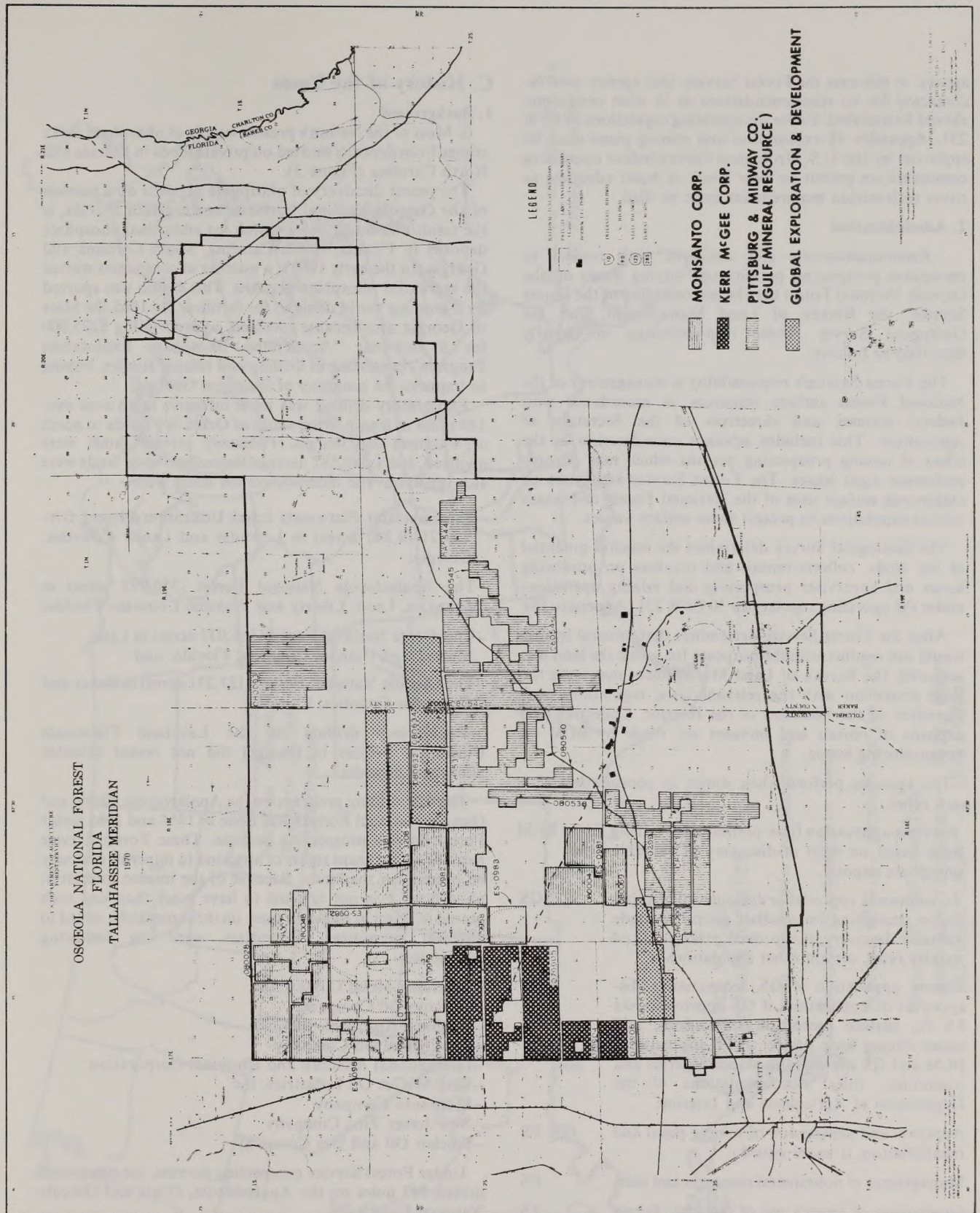
OSCEOLA NATIONAL FOREST FLORIDA TALLAHASSEE MERIDIAN 1970



LEGEND

- NATIONAL FOREST BOUNDARY
- STATE BOUNDARY
- COUNTY BOUNDARY
- SECTION BOUNDARY
- SECTION 1
- SECTION 2
- SECTION 3
- SECTION 4
- SECTION 5
- SECTION 6
- SECTION 7
- SECTION 8
- SECTION 9
- SECTION 10
- SECTION 11
- SECTION 12
- SECTION 13
- SECTION 14
- SECTION 15
- SECTION 16
- SECTION 17
- SECTION 18
- SECTION 19
- SECTION 20
- SECTION 21
- SECTION 22
- SECTION 23
- SECTION 24
- SECTION 25
- SECTION 26
- SECTION 27
- SECTION 28
- SECTION 29
- SECTION 30
- SECTION 31
- SECTION 32
- SECTION 33
- SECTION 34
- SECTION 35
- SECTION 36
- SECTION 37
- SECTION 38
- SECTION 39
- SECTION 40
- SECTION 41
- SECTION 42
- SECTION 43
- SECTION 44
- SECTION 45
- SECTION 46
- SECTION 47
- SECTION 48
- SECTION 49
- SECTION 50
- SECTION 51
- SECTION 52
- SECTION 53
- SECTION 54
- SECTION 55
- SECTION 56
- SECTION 57
- SECTION 58
- SECTION 59
- SECTION 60
- SECTION 61
- SECTION 62
- SECTION 63
- SECTION 64
- SECTION 65
- SECTION 66
- SECTION 67
- SECTION 68
- SECTION 69
- SECTION 70
- SECTION 71
- SECTION 72
- SECTION 73
- SECTION 74
- SECTION 75
- SECTION 76
- SECTION 77
- SECTION 78
- SECTION 79
- SECTION 80
- SECTION 81
- SECTION 82
- SECTION 83
- SECTION 84
- SECTION 85
- SECTION 86
- SECTION 87
- SECTION 88
- SECTION 89
- SECTION 90
- SECTION 91
- SECTION 92
- SECTION 93
- SECTION 94
- SECTION 95
- SECTION 96
- SECTION 97
- SECTION 98
- SECTION 99
- SECTION 100

THIS MAP IS A REPRODUCTION OF A MAP
PUBLISHED BY THE U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE, WASHINGTON, D.C. 20250
IN 1970



agency, in this case the Forest Service, that agency must be contacted for its recommendations as to what conditions should be included. Under the operating regulations 30 CFR 231, Appendix 16 exploration and mining plans must be approved by the U.S. Geological Survey before operations commence on permit or lease lands. A bond adequate to cover reclamation requirements must be filed.

2. Administration

Recommendations and decisions with respect to phosphate prospecting permits and mining leases on the Osceola National Forest are the responsibility of the Forest Service, the Bureau of Land Management, and the Geological Survey. These responsibilities are briefly described as follows:

The Forest Service's responsibility is management of the National Forest surface resources in accordance with Federal statutes and directives of the Secretary of Agriculture. This includes advance consideration of the effect of issuing prospecting permits which may become preference right leases. The Forest Service supervises all authorized surface uses of the National Forest and issues special stipulations to protect these surface values.

The Geological Survey determines the mineral potential of the lands, collects rentals and royalties on producing leases and supervises prospecting and mining operations under the operating regulations 30 CFR 231 (Appendix 16).

After the Forest Service determines that mineral leasing would not conflict with the purposes for which the land was acquired, the Bureau of Land Management may issue the lease consistent with the relevant laws, regulations, and directives of the Secretary of the Interior. Collection and deposits of rentals and bonuses are made by BLM on nonproducing leases.

The agencies perform their duties in consultation with each other.

Receives application from permittee for mining lease based on right of discovery of valuable phosphate deposit.	BLM
Recommends approval or disapproval of application depending on whether permittee made valuable discovery; if approved, sets rental and royalty rates, certain other stipulations.	GS
Rejects application if GS recommends disapproval of application; if GS approves, asks FS for surface protection stipulations, and issues mining lease subject to FS stipulations, BLM and GS stipulations, standard terms and conditions, rules and regulations of the Department of Agriculture and Interior.	BLM
Approval and supervision of mining plans and rehabilitation, if leases issued.	GS, FS
Management of nonmineral resources and uses.	FS
Supervision of lessee's use of National Forest lands outside of leased area.	FS
Reasonable readjustment of lease terms at end of 20-year periods.	BLM, GS

C. History of the Cases

1. Background

Most of the Nation's present supply of phosphate rocks comes from deposits located on private lands in Florida and North Carolina (Figure 3).

The recent discovery of phosphate deposits on a portion of the Osceola National Forest in northeastern Florida, is the result of a much wider search for additional phosphate deposits in Florida, North Carolina, South Carolina and Georgia. In the early 1960's, a number of companies started the search for phosphate deposits. This search was spurred by a growing world demand for fertilizer. In 1965 the State of Georgia also became involved, appropriating \$225,000 for a two-year "Accelerated Phosphate Exploration Program" consisting of drilling and related studies, hoping to improve the economy of Southern Georgia.

Exploratory drilling was most intensive in an area over 150 miles in length, from south of Ocala in Florida to north of Valdosta in Georgia. Primarily private lands were involved, but 1,089,582 acres of federally-owned lands were also involved. The federally-owned lands were--

- The Lakeland Flatwoods Land Utilization Project GA-LU-21 (9,340 acres) in Lowndes and Lanier Counties, Georgia;
- The Apalachicola National Forest (556,972 acres) in Franklin, Leon, Liberty and Wakulla Counties, Florida;
- The Ocala National Forest (366,037 acres) in Lake, Marion and Putnam Counties, Florida; and
- The Osceola National Forest (157,231 acres) in Baker and Columbia Counties, Florida.

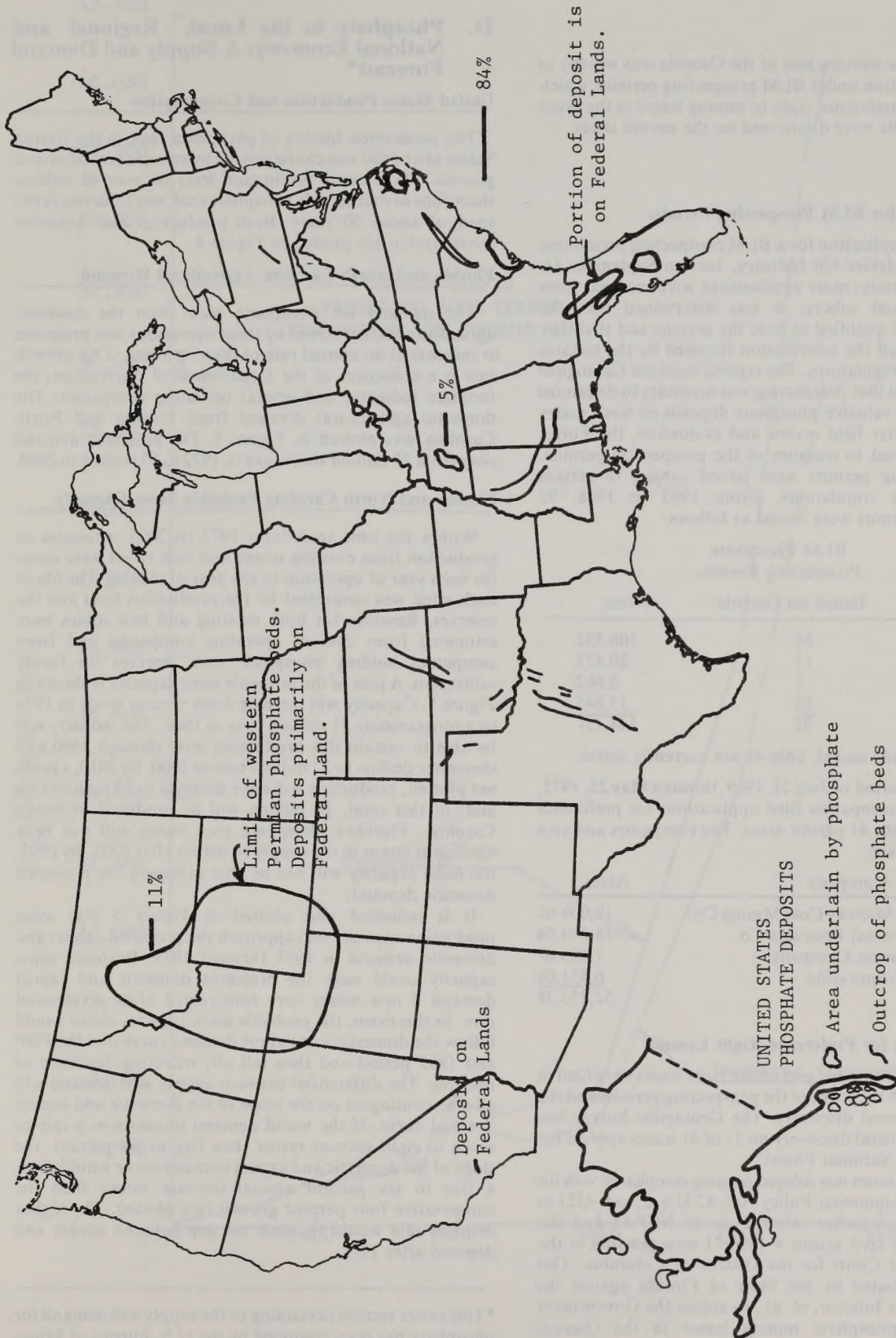
Exploratory drilling on the Lakeland Flatwoods Utilization Project in Georgia did not reveal valuable phosphate deposits.

The first drilling program on the Apalachicola, Ocala and Osceola National Forests was done in 1964 and 1965 under Forest Service prospecting permits. These Forest Service permits do not grant rights of any kind to minerals that may be present on the lands. Because of the intense interest in phosphate, it is not unusual to have more than one such permit in effect at the same time, on the same lands, issued to different permittees. Permittees were the following companies--

- American Metal Climax, Inc.
- Chevron Oil Company
- Cominco American, Inc.
- Continental Oil Company
- International Minerals and Chemical Corporation
- Kerr-McGee Oil Industries, Inc.
- Monsanto Company
- New Jersey Zinc Company
- Sinclair Oil and Gas Company

Under Forest Service prospecting permits, the companies drilled 949 holes on the Apalachicola, Ocala and Osceola National Forests.

This drilling indicated that no valuable phosphate deposits existed on Federal lands on the Apalachicola, the Ocala, and the east half of the Osceola, but they did



Percent of U.S. production in 1972

Source of information

MINERALS YEARBOOK - 1972, USBM

NATIONAL ATLAS - 1970, USGS

indicate that the western half of the Osceola was worthy of further exploration under BLM prospecting permits, which would grant a preference right to mining leases in the event valuable deposits were discovered on the permit lands.

2. Application for BLM Prospecting Permits

The first application for a BLM prospecting permit was filed by Kerr-McGee Oil Industry, Inc. on September 11, 1964. Subsequently, more applications were received from Kerr-McGee and others. It was determined that the applicants were qualified to hold the permits and that they had furnished all the information required by the statutes and associated regulations. The reports from the Geological Survey indicated that prospecting was necessary to determine the presence of valuable phosphate deposits on lands under application. After field review and evaluation, the Forest Service consented to issuance of the prospecting permits. The prospecting permits were issued subject to certain Forest Service stipulations. From 1965 to 1968, 92 prospecting permits were issued as follows:

BLM Phosphate Prospecting Permits		
Year	Issued on Osceola	Acres
1965	64	106,552
1966	15	20,872
1967	3	2,862
1968	10	13,845
	<u>92</u>	<u>144,131</u>

Of the 92 permits issued, only 41 are currently active.

During the period of July 21, 1969, through May 25, 1972, the concerned companies filed applications for preference right leases on the 41 permit areas. The companies and area of application are:

Company	Acres
Pittsburgh and Midway Coal Mining Co.	19,009.61
Monsanto Chemical Products Co.	18,899.04
Global Exploration Company	7,693.67
Kerr-McGee Corporation	<u>6,551.06</u>
	52,253.38

3. Application for Preference Right Leases

The applications for preference right leases were filed in accordance with the terms of the prospecting permits and the applicants' mineral discovery. The Geological Survey has certified the mineral discovery on 21 of 41 leases applied for in the Osceola National Forest.

Action on the leases was delayed pending compliance with the National Environmental Policy Act, 42 U.S.C. sec. 4321 et seq. (1969) (hereinafter referred to as NEPA) and the outcome of the civil action # 1496-71 now pending in the Federal District Court for the District of Columbia. This action was initiated by the State of Florida against the Secretary of the Interior, et. al., to enjoin the Government from issuing phosphate mining leases in the Osceola National Forest.

D. Phosphate in the Local, Regional and National Economy: A Supply and Demand Forecast*

United States Production and Consumption

The production history of phosphate rock in the United States after 1880 was characterized by an exponential rate of growth. The current production level of over 40 million short tons of marketable phosphate rock was achieved in the span of about 90 years. Both production and domestic consumption are plotted in Figure 4.

Florida and North Carolina Agricultural Demand

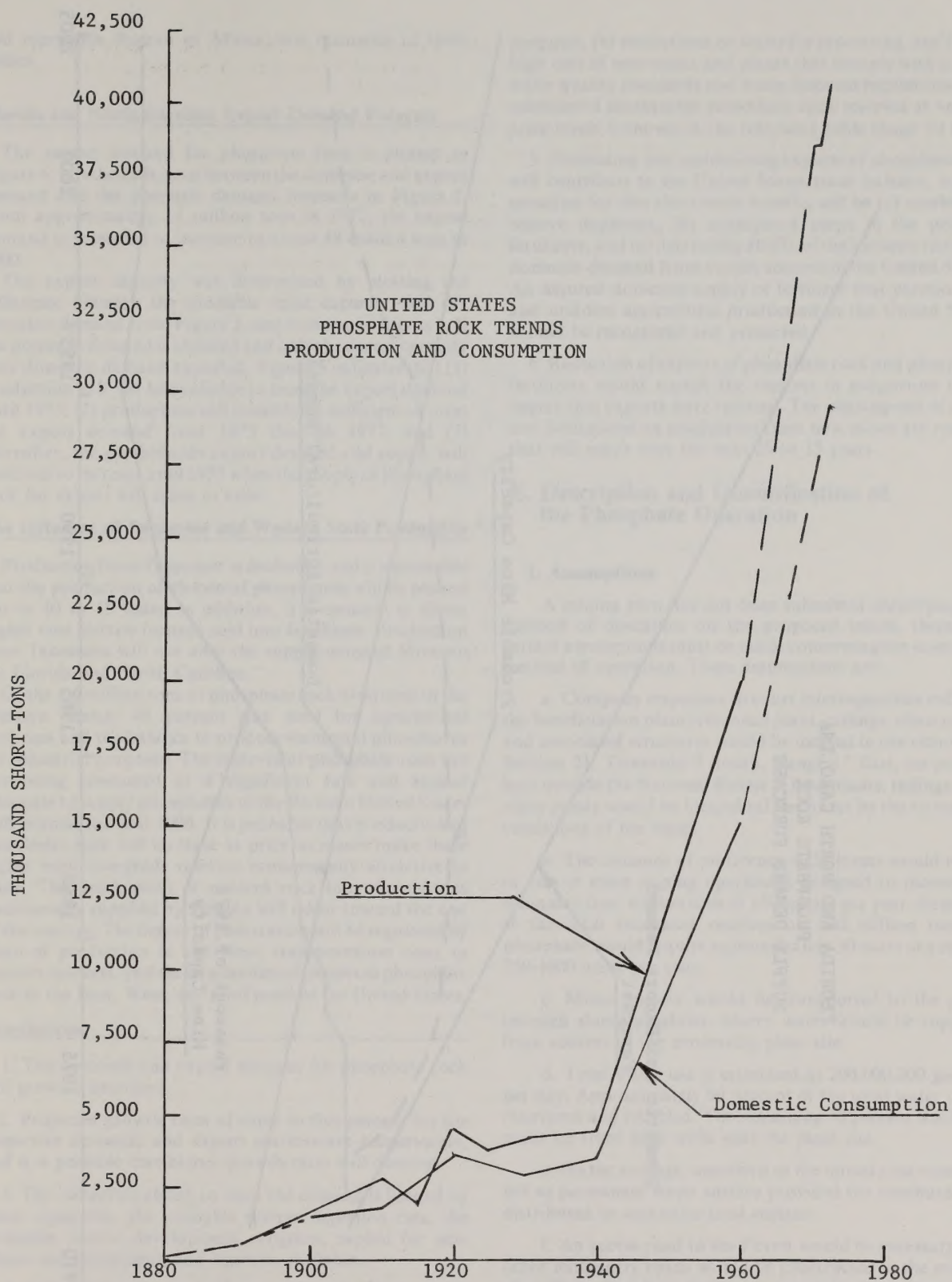
The demand for phosphate rock from the domestic agriculture market served by these operations was projected to increase at an annual rate of three percent. This growth rate is a consensus of the Department of Agriculture, the fertilizer industry, and several operating companies. The domestic agricultural demand from Florida and North Carolina was plotted in Figure 5. The projected demand rises from 23 million short tons in 1972 to 53 million in 2000.

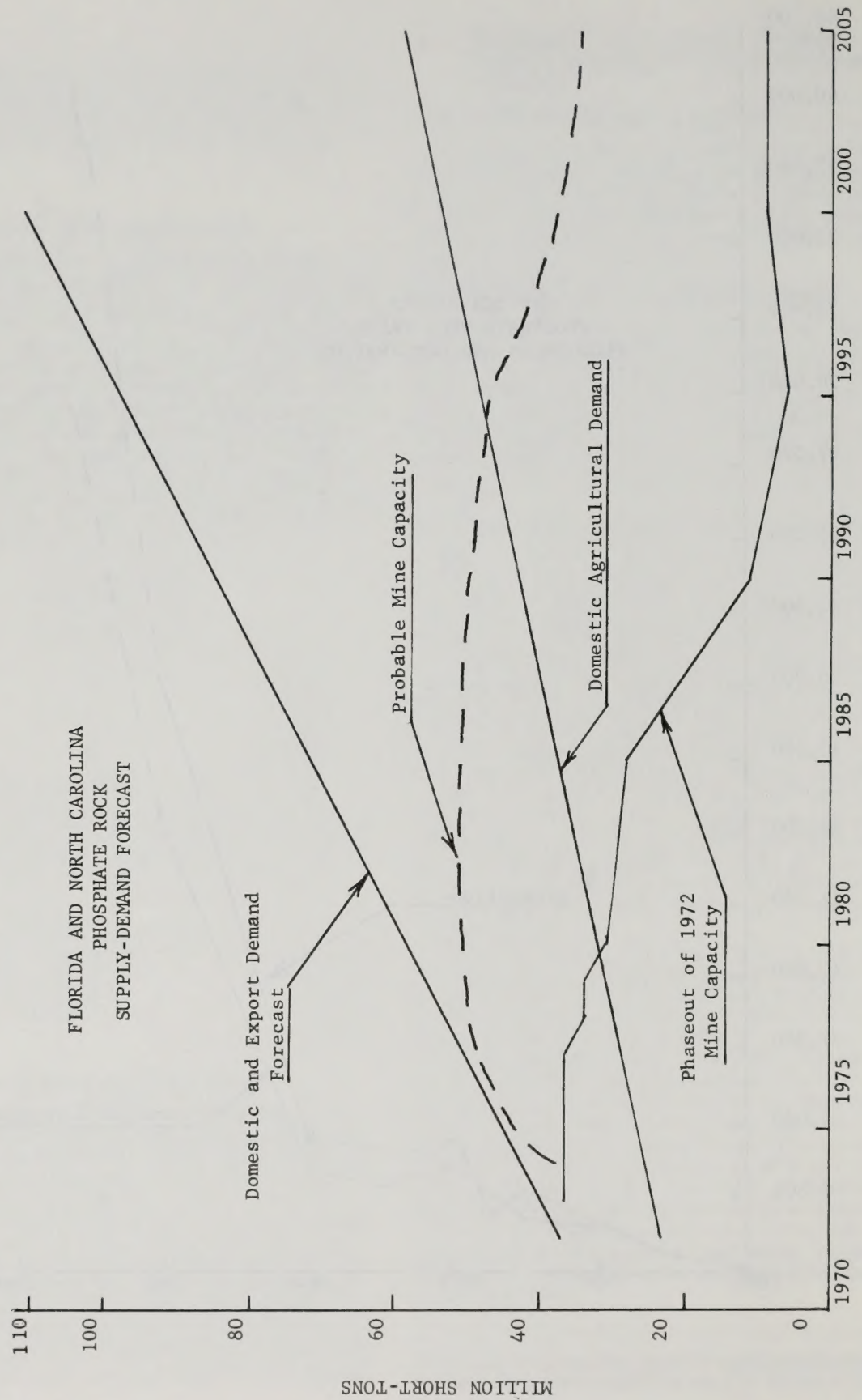
Florida and North Carolina Probable Mine Capacity

Within the time span from 1973 to 2005, estimates of production from existing mines and new mines were made for each year of operation to the year of closing. The life of each mine was controlled by the production level and the reserves. Reserves for both existing and new mines were estimated from data of operating companies and from companies holding phosphate rock reserves for future utilization. A plot of the probable mine capacity is shown in Figure 5. Capacity will increase from present levels in 1974 to approximately 51 million tons in 1980. The industry will be able to sustain this production level through 1990 and thereafter decline to 37 million tons in 2000. By 2010, a point not plotted, production will have declined to 22 million tons and, of this total, 18 million will be produced in North Carolina. Florida's phosphate rock mines will not be a significant factor in the supply structure after 2005. By 1995, the mine capacity will not be able to supply the projected domestic demand.

It is indicated and plotted in Figure 5 that mine production capacity will approach the projected export and domestic demand in 1975 through 1978. Probable mine capacity could meet the projected domestic and export demand if new mines were constructed at an accelerated rate. In this event, the probable mine capacity curve would follow the domestic and export demand curve into the 1980 and 1985 period and then fall off, reflecting depletion of reserves. The differential between supply and demand will also be contingent on the slope of the domestic and export demand curve. If the world demand increases at a rate of seven to eight percent rather than five to six percent, the slope of the domestic and export demand curve would show a five to six percent annual increase rather than the conservative four percent growth rate plotted. The higher demand rate would increase the gap between supply and demand after 1978.

*This entire section pertaining to the supply and demand for phosphate has been compiled by the U.S. Bureau of Mines





and represents Bureau of Mines' best estimates of these values.

Florida and North Carolina Export Demand Forecast

The export demand for phosphate rock is plotted in Figure 6. It is the difference between the domestic and export demand and the domestic demand forecasts in Figure 5. From approximately 14 million tons in 1972, the export demand is projected to increase to about 48 million tons in 2000.

The export capacity was determined by plotting the difference between the probable mine capacity and the domestic demand from Figure 5, and is shown in Figure 6. If the domestic demand is satisfied and only the excess capacity over domestic demand exported, Figure 5 indicates that (1) production will not be available to meet the export demand until 1975; (2) production will possibly be sufficient to meet the export demand from 1975 through 1977; and (3) thereafter, the gap between export demand and supply will continue to increase until 1955 when the supply of phosphate rock for export will cease to exist.

The Influence of Tennessee and Western State Production

Production from Tennessee is declining, and it is probable that the production of elemental phosphorus will be phased out in 10 to 15 years. In addition, it is unusual to direct higher cost electric furnace acid into fertilizers. Production from Tennessee will not alter the supply-demand forecasts for Florida and North Carolina.

Of the 4.6 million tons of phosphate rock produced in the Western States, 40 percent was used for agricultural purposes and the balance to produce elemental phosphorus for industrial purposes. The reserves of phosphate rock are not being consumed at a significant rate and appear adequate to supply phosphorus to the Western United States well beyond the year 2000. It is probable that production of phosphate rock will increase as price increases make these higher cost, low-grade reserves economically attractive to mine. The penetration of western rock into the markets traditionally supplied by Florida will occur toward the end of the century. The degree of penetration will be regulated by costs of production in the West, transportation costs to Eastern markets, and the availability of imported phosphate rock to the East, West, and Gulf ports of the United States.

Conclusions

1. The domestic and export demand for phosphate rock will grow as described.
2. Projected growth rates of three to five percent for the respective domestic and export markets are conservative, and it is possible that higher growth rates will develop.
3. The industry's ability to meet the demand is limited by plant capacities, the probable reserve depletion rate, the probable reserve development program, capital for new plants and equipment, and reserves available.
4. Industry's estimates of phosphate rock reserves in Florida vary from one to one and one-half billion tons. The availability of these reserves will be reduced by (a) assignment of phosphate-bearing reserve land for other

purposes, (b) restrictions on water for processing, and (c) the high cost of new mines and plants that comply with air and water quality standards and waste disposal regulations. An estimate of marketable phosphate rock reserves at various price levels is shown in the following table (page I-11):

5. Promoting and maintaining exports of phosphate rock will contribute to the United States trade balance, but the penalties for this short-term benefits will be (a) accelerated reserve depletion, (b) anticipated surge in the price of fertilizers, and (c) decreasing ability of the industry to supply domestic demand from supply sources in the United States. An assured domestic supply of fertilizer that permits high and uniform agricultural production in the United States should be recognized and protected.

6. Reduction of exports of phosphate rock and phosphatic fertilizers would stretch the reserves in proportion to the degree that exports were reduced. The phasing-out of mines and limitations on production from new mines are realities that will occur over the next 25 to 35 years.

E. Description and Quantification of the Phosphate Operation

1. Assumptions

A mining plan has not been submitted identifying the method of operation on the proposed leases, therefore, certain assumptions must be made concerning the scope and method of operation. These assumptions are:

a. Company responses to court interrogatories indicate the beneficiation plant, chemical plant, tailings, slime ponds and associated structures would be located in the vicinity of Section 21, Township 2 South, Range 17 East, on private land outside the National Forest. These plants, tailings, and slime ponds would be located off the forest by the terms and conditions of the lease.

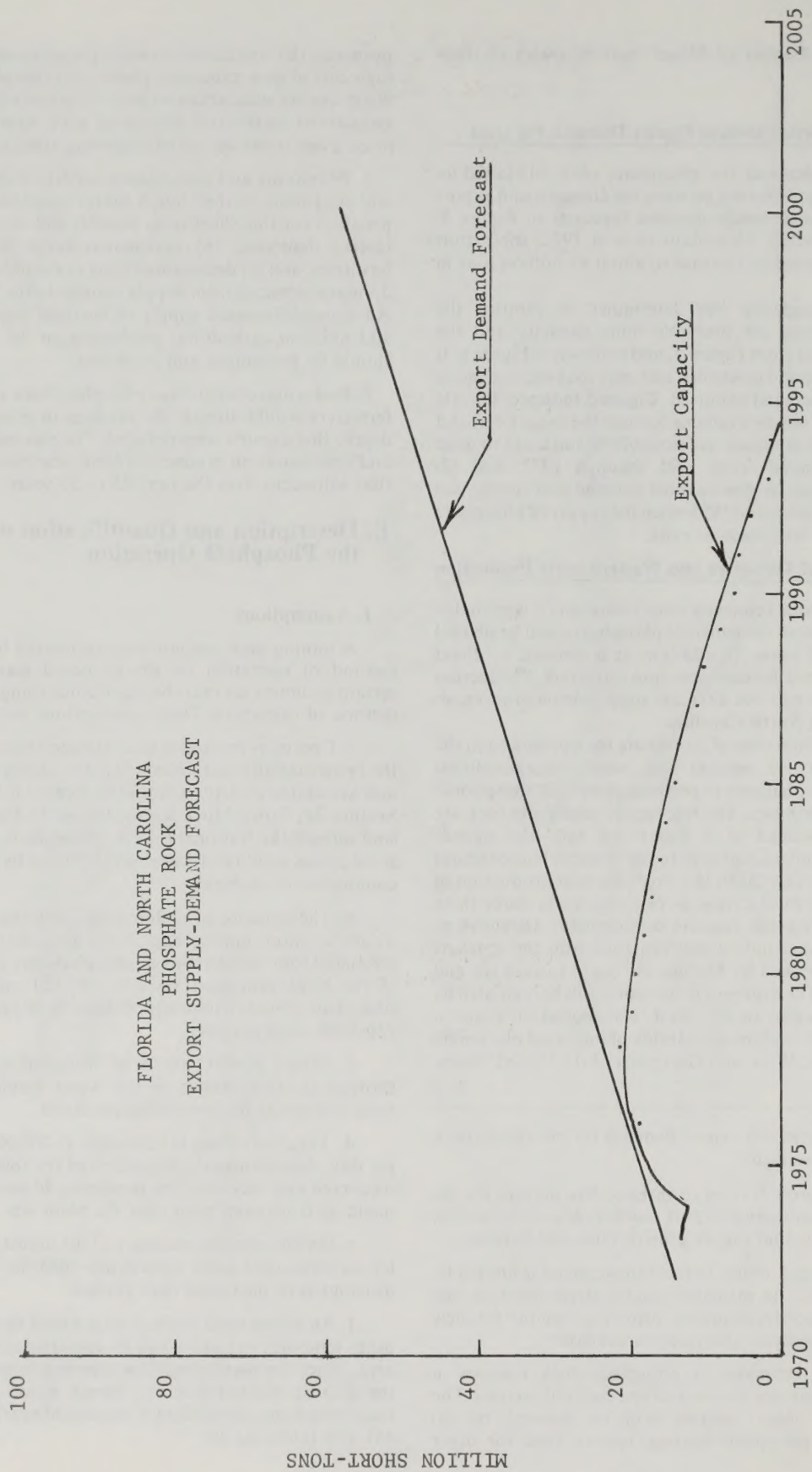
b. The issuance of preference-right leases would result in one or more mining operations designed to recover an estimated four million tons of phosphate per year. Removal of the total estimated reserves on 120 million tons of phosphate would require approximately 30 years at a rate of 750-1000 acres per year.

c. Mined matrix would be transported to the plant through slurry pipelines. Slurry water would be supplied from sources at the processing plant site.

d. Total water use is estimated at 200,000,000 gallons per day. Approximately 90 percent of the total water use is recovered and recycled. The remaining 10 percent would be made up from deep wells near the plant site.

e. On the average, one-third of the mined area would be left as permanent water surface provided the overburden is distributed to maximize land surface.

f. An access road to the Forest would be necessary and other temporary roads would be constructed in the mining area. Since the plant site(s) are expected to be located near the western boundary of the Forest, construction of new major roads are not necessary because of nearby U.S. Route 441 and Interstate 10.



BUREAU OF MINES
ESTIMATE OF MARKETABLE
PHOSPHATE RESERVES

Reserves - Recoverable Tons at Various Prices
(In Millions Short Tons)

	<u>\$8.05^{1/}</u>	<u>\$12.08^{2/}</u>	<u>\$20.13^{3/}</u>	<u>% P₂O₅</u>
North America				
United States				
Fla.	1,200	1,600	2,500	32
N.C.	382	1,171	2,382	32
Tenn.	30	120	600	24-32
Ida.	200	2,000	6,000	24-32
Mont.	3	260	1,200	20-32
Utah	200	400	2,300	31-32
Wyo.	1	140	440	32
Other	<u>--</u>	<u>100</u>	<u>300</u>	<u>32</u>
Total	2,016	5,791	15,722	20-32

^{1/} Estimated recoverable reserves at \$8.05/short ton. Price published by PHOSPHATE ROCK EXPORT ASSOCIATION for 70 BPL grade of rock, f.o.b., Florida Plant and effective March 1, 1973.

^{2/} Estimated reserves at 1.5 times March 1, 1973 price.

^{3/} Estimated reserves at 2.5 times March 1, 1973 price.

g. The beneficiation plant, chemical plant, and associated structures would occupy about 95 acres. Another 10 to 15 acres of low-elevation land would be used for reclaiming water and raising the land elevation with sand tailings. Slimes derived from mining the National Forest would be retained in ponds on mined out private land. They would occupy an area of about 10,000 to 12,000 acres with a total depth of about 50 feet. The height of the dam above original ground level would be about 20 feet.

h. The Georgia Southern and Florida Railroad is located west of the Forest. A spur would be run several miles to the assumed plant location in Sections 21, T. 2 S., R. 17 E. Sulfur would be transported to the plant on the spur, and acid or chemical fertilizers would be shipped by rail to Jacksonville.

i. Production of four million tons per year of phosphate and fertilizer products requires about four hundred million kilowatt hours of electricity.

j. A typical four million ton per year phosphate operation would employ a labor force of between 700 and 750 with varying degrees of skill. The plant would operate seven days per week with three shifts per day. Draglines would operate 20 shifts per week with one shift designated for maintenance activity.

k. Operations in the Forest would be limited to typical activities associated with mining procedures such as developing access roads, supplying utilities to support mining, and laying pipelines to transport the matrix from the mining area to the off-site plant.

l. Reclamation programs of this magnitude have not been observed in Northern Florida. A reclamation program designed to this scale would be conducted concurrently with mining operations in accordance with an approved mining plan.

2. Overview of the Operation

The phosphate deposit on the Osceola National Forest is a part of a larger phosphate ore body, approximately two-thirds of which is on private lands adjoining the Osceola National Forest.

Based on the exploratory drilling that has been done to date and the preliminary nature of ore reserve calculations, about 23,500 acres or about 45 percent of the total 52,000 acres under application, will be actually mined (Sec. XI, Maps 1 and 2). This is approximately 18 percent of the 157,200 acres of Public land in the Osceola National Forest. There could be one mining operation designed to produce four million tons of marketable phosphate rock product annually. The total estimated reserve on the Forest is 120 million tons facilitating an operation of an approximate 30-year duration.

Production at this rate requires 750 to 1000 acres of land to be mined per year. Mining at this rate also requires the use of 135,000 gallons of water per minute. Approximately 90 percent of this water is recycled, but 10 percent of 13,500 gallons/minute is lost and must be made up with water from deep wells. These deposits can only be mined economically by surface mining methods, because of a shallow water table and the unconsolidated nature of the sediments involved. All

phosphate rock now being produced in Florida is recovered by this type of mining. The mining method would be similar to those being used in central and northern Florida, except reclamation would be performed in accordance with an approved mining plan and it would also include the associated beneficiation through the drying of phosphate pellets. The phosphate rock may be processed into phosphoric acid, diammonium phosphate and triple super-phosphate.

Pre-mining activities in the National Forest would be limited to developing access roads, supplying utilities to support mining, and laying pipelines to transport the matrix from the mining area to the off-site plant.

3. Mining Methods

Surface mining requires comprehensive planning. To develop logical and orderly mining and reclamation plans, drill holes on 2½ acre centers are required to delineate the ore bodies and to determine the quantity and quality of material available for reclamation. Development drilling is typically accomplished by small gasoline powered hand-held augers or truck-mounted core drills (Photos 1 and 2). Holes are generally less than 50' deep and commonly bottom out in hard limestone. The holes may be cased to prevent collapse; occasionally the casing is left behind. The auger cuttings or drill core are logged in the field and any phosphate bearing zones are sampled and assayed. The remaining material is put back into the hole. If the cuttings and drill core are insufficient to fill the hole, then surficial soil is shoveled into the hole until it is sealed. Development drilling will continue in a particular area until the ore body is adequately defined, usually 3-5 years ahead of mining.

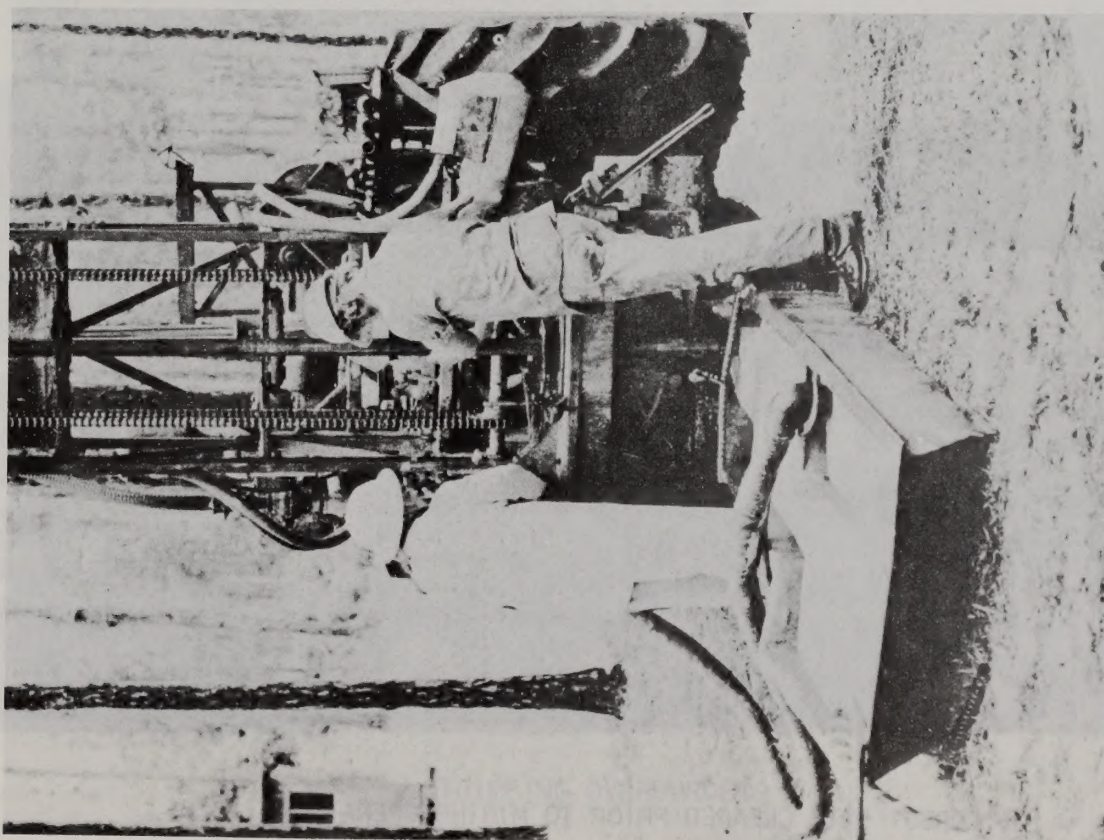
After an ore body is evaluated adequately by development drilling and sampling, an extensive engineering survey is undertaken to prepare plans for the actual mining operation. Among the items included by this survey are drainage and water supply requirements, mining layout, reclamation plans, pipeline systems, electric power distribution systems, and the transportation system.

Shortly before excavation begins, the area is prepared for mining. Ditches of sufficient depth are dug to drain off surface water and any merchantable timber overlying the mining area is logged. All timber that is cut or destroyed is paid for at rates prescribed by the Forest Service. Brush and small trees are removed by a bulldozer walking with its blade in light contact with the ground. The vegetative debris, including surface muck, is pushed into windrows providing a cleared path for a dragline. The windrow material is later put into mined out pits by the dragline and covered with overburden. This procedure is repeated for each cut.

Occasionally it is necessary to reroute temporarily streams that flow through the area to be mined.

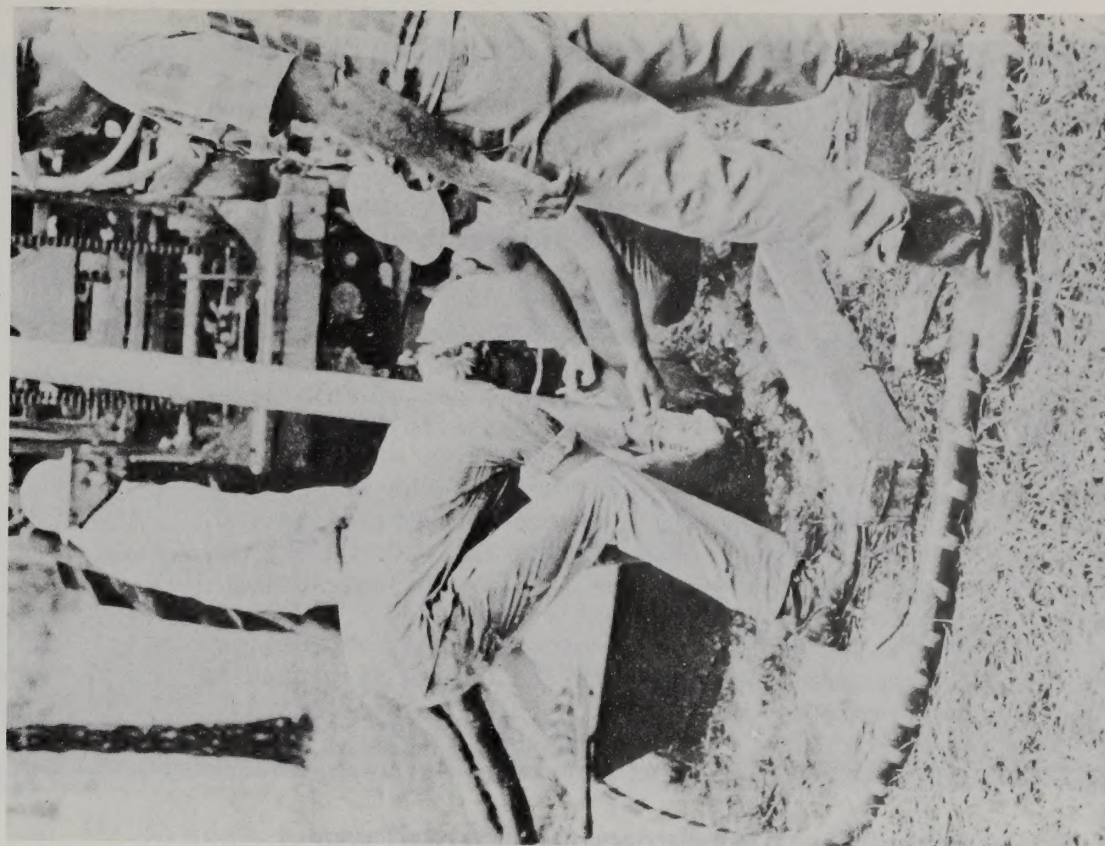
Mining and certain phases of reclamation are performed by electrically powered walking draglines (Photo Nos. 3 and 4). Such machines are quite large and may have bucket capacities of up to 49 cubic yards and boom lengths from 200 to 285 feet.

The following table (from Bowlter, 1968) indicates specifications for a 35 cubic yard walking dragline which is probably typical of the larger draglines used in the Florida phosphate mines. Lately there has been a trend toward larger and more expensive machines.



EXPLORATORY DRILLING OPERATION PORTABLE DRILLING RIG

CENTRAL FLORIDA



EXPLORATORY DRILLING CREW CORE REMOVAL FOR SAMPLING

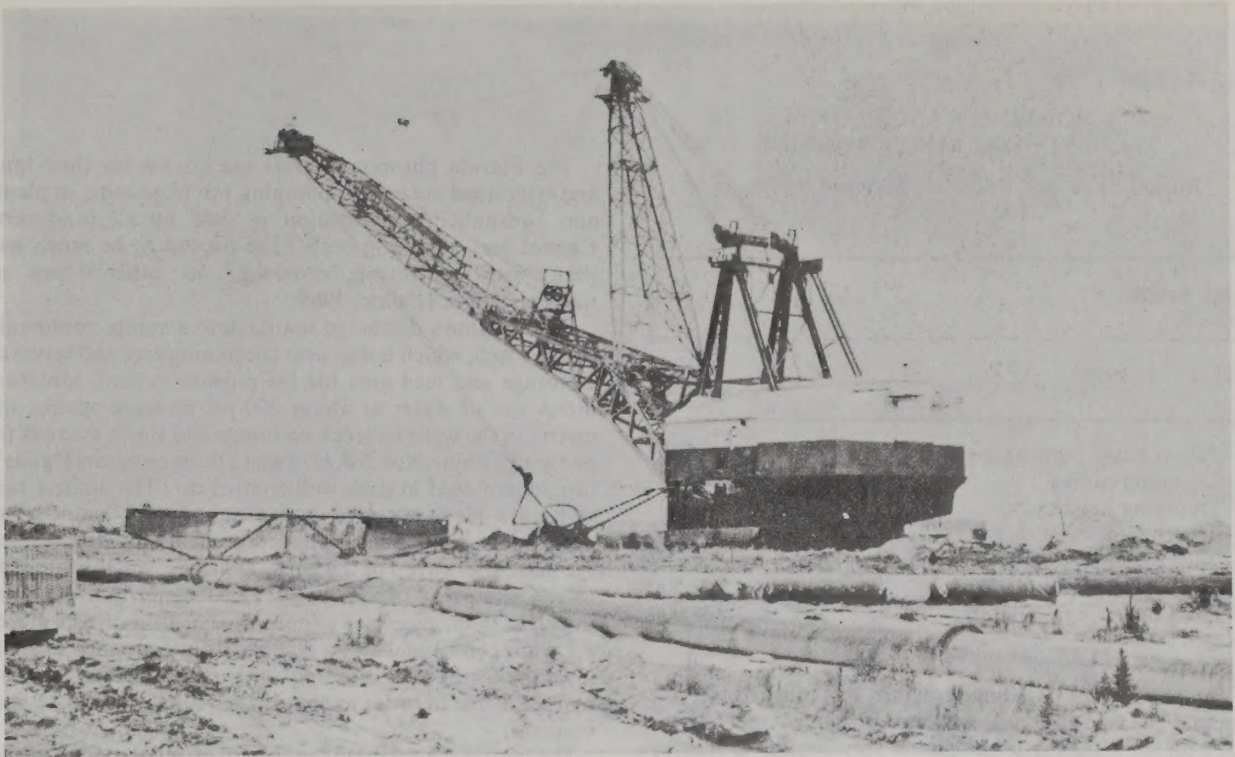
CENTRAL FLORIDA



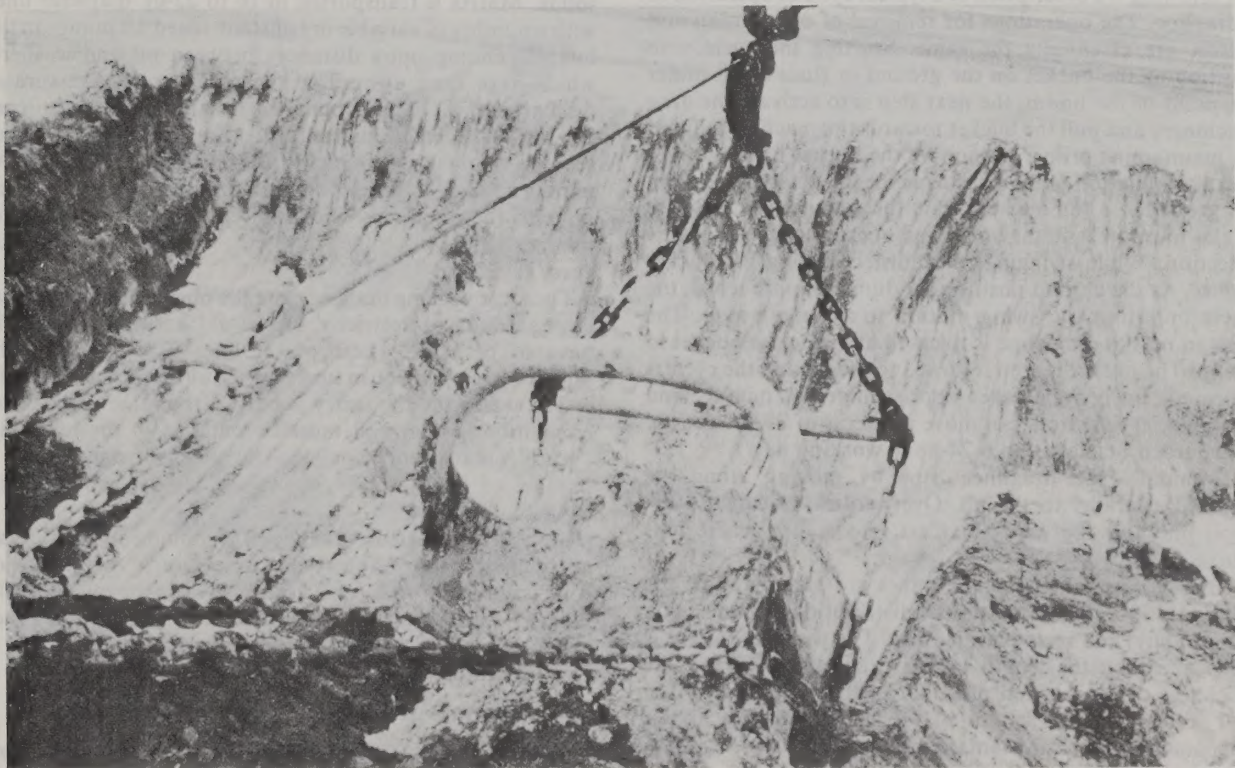
ACCESS ROAD THROUGH OSCEOLA NATIONAL FOREST



FOREST SITE CLEARED PRIOR TO MINING OPERATIONS
NORTHERN FLORIDA



TYPICAL DRAGLINE OPERATION



STRIPPING OVERBURDEN

**WORKING RANGES OF
35-CU. YD. WALKING DRAGLINE**
Bucket Sizes Are Based on Material Weighing
100 lb./cu. ft.

Boom length	220'
Bucket size, cu yd	35
A - Boom angle (approx.)	30°
B - Dumping radius	211'-0"
C - Dumping height	81'-0"
D - Depth (std. cables)	110'-0"
*E - Bucket throw	35-55'
Maximum allowable load, lb	177,500
Drag pull, single line, lb	325,000

*Depends on skill of operator

The shoes of a walking dragline rest directly on the ground. The machine moves by eccentric movement of the shoes on each side. The process is very similar to that by which a man on his hands and knees progresses by resting his weight on his hands and swinging his body forward with feet dragging, then rests on his knees and toes while he moves his hands forward again. (Nichols, 1962.)

Following is a description of a typical cycle of operation of a dragline. The operations for removal of overburden and matrix are essentially the same. Starting the cycle with positioning the bucket on the ground or floor of pit under the point of the boom, the next step is to activate the drag machinery and pull the bucket towards the machine to fill it. By maintaining proper tension on the bucket by drag ropes and manipulation of the hoist rope the bucket is raised from the ground. As the bucket clears the ground, the machine begins to rotate, and the boom and bucket swing in the same direction. While swinging, the hoist is raising the bucket higher. As the desired position for dump is approached, the operator brings the swing motion to a smooth stop. The tension on the drag rope is released allowing the bucket to dump. The bucket is then returned to the pit and the cycle is repeated. Each cycle takes approximately 1 minute, and experienced operators can move in excess of 75,000 tons of overburden or matrix in a 24-hour working day.

Essentially the dragline strips by moving along the highwall, parallel to the pit. Overburden is cast onto the spoil pile and the matrix is cast into sumps where it is slurried.

Mining cuts for phosphate mines are planned to fit the configuration of the property (distribution of the ore + topography) and reclamation plans. The width of the cut is determined by the length of the dragline boom and the thickness of overburden plus matrix. Cuts average 150 to 250 feet wide. The length of the cut is variable and is dependent upon the reclamation plan. Cuts may be several thousand feet long.

The unconsolidated overburden consisting of sand and clay from the first cut is piled on natural ground. Overburden from subsequent cuts is cast into adjacent mined out cuts. The overburden must be discharged far enough away so as not to slip back into the active cut.

The Florida phosphate mines are known for their long and continued success in pumping ore from mine to plant, and hydraulic transportation is used by all producers. Capital and operating costs have proved to be much less than with conveying, trucking, or other types of transportation. (Falkie, 1969.)

The draglines discharge matrix into a sump, commonly called a well, which is dug near the mining area and serves as a storage and feed area for the pipeline system. Monitors direct jets of water at about 200-psi pressure against the matrix in the wells to break up lumps and slurry the rock for pumping (Photo Nos. 5 & 6). Two to three monitors ("guns") usually are used in each well control car. The control cars often are glass enclosed and air-conditioned, and some producers now use programmed controls for determining the pattern of sweep of the guns. Typically, water is supplied to the sumps at capacities of 12,000 gpm (gal per min) through 24-in. pipelines (Photo No. 5) from direct-driven 1,250hp, centrifugal-stage pumps. Booster pumps, usually lower in horsepower, are frequently required in series in the hydraulic line in order to supply the required pressures and volumes.

The matrix is slurried through 6-in. grizzlies to the mine or pit pump which is also direct-driven and ranges in size from 800 to 1,500 hp. Capacities in the field vary from 400 to 2,000 cu yd per hr of matrix delivered to the washer. Target slurry pumping rates are from 8,000 to 25,000 gpm at 30 to 40% solids. Matrix is transported in 16 to 22-in. diameter lines with a number of variable or constant-speed lift pumps in the line, depending upon distances between pit and washer--which have been upward to ten miles or so. Pressure at discharge of pit and lift pumps is usually in the range from 100 to 150 psi, and design velocities are around 15 fps (ft per sec), with higher velocities required for coarser ores. As mining advances, the pit pumps and wells are moved to keep up with the draglines. These moves, of course, depend on mining depths, dragline sizes, etc., but are usually made every few days.

The large walking draglines and the pipeline pumps require large amounts of electricity. Electrical transmission lines will have to be built. These power lines usually follow the pipeline routes, which in turn tend to follow the access roads.

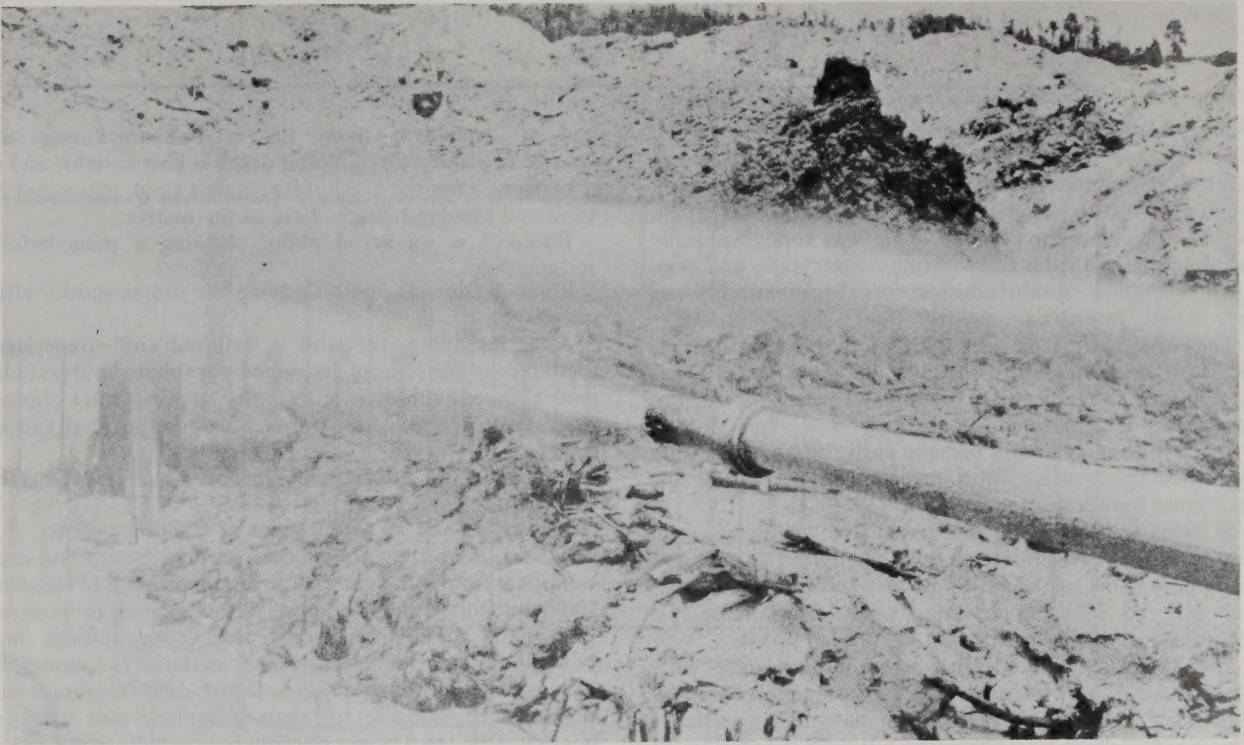
The water for the slurry is part of the mine-plant water circulation system and must be pumped to the hydraulic "guns" via a second pipeline. This pipeline is generally parallel to the slurry pipeline and has its own electrical centrifugal pumps.

In order to staff and service the mining operation, an adequate transportation system is necessary. A 26-footwide road is necessary to furnish access between the mine and the plant. As mining progresses from area to area, some roads are mined out and other roads are no longer used; thus, at irregular intervals new roads will have to be built.

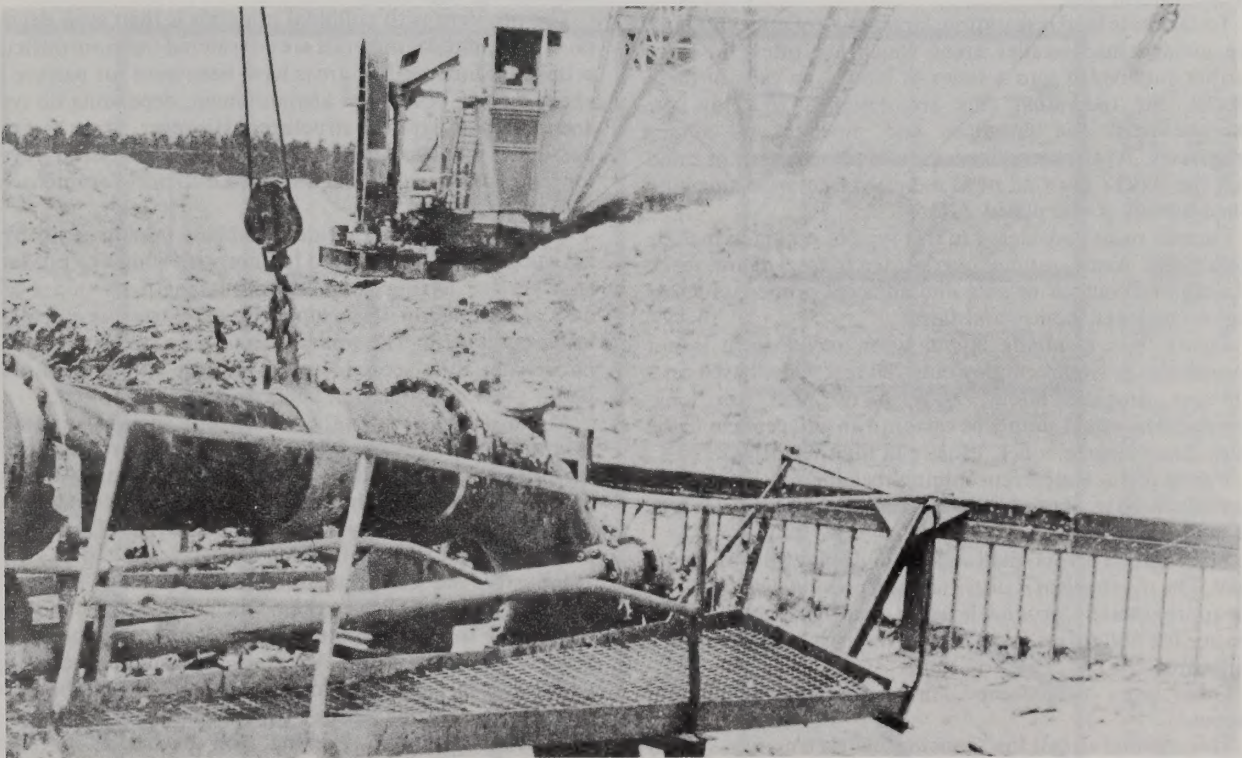
4. Reclamation Methods

In Central Florida, prior to the 1920's, phosphate mining by hydraulic methods with no reclamation, left the mined areas as ponds and lakes and rolling terrain. After a number of years, vegetation re-established itself naturally and a fish population became established in the ponds.

Draglines were first introduced into Central Florida in the



SLURRY OPERATION HIGH PRESSURE NOZZLES



SLURRY OPERATION SUCTION PUMP TO PLANT

1920's. At first, the draglines were small. Draglining with no reclamation left mined areas as irregular masses of overburden and bodies of water. As draglines became larger, draglining with no reclamation left windrows of overburden, mostly with water in between. This was topographically incompatible with the surrounding countryside; and even when vegetation established itself, visual compatibility was only slightly improved.

The earliest efforts in reclamation took place in the mid-1950's on a small scale on a little over 200 acres. The area was costly to reclaim because the mining had been done without considering reclamation.

Between the mid-1950's and the early 1960's, there were small scattered reclamation projects by several of the phosphate mining companies.

In the early 1960's, the "Concurrent" Reclamation System was developed and utilized to varying degrees by different companies. This method is applicable to mined lands that will not be used as settling basins. Reclamation is accomplished at reasonable cost.

The system involves deciding before mining begins what the land should look like after mining is completed. Since the removal of thousands of tons of phosphate matrix will leave a pit which will ultimately become a lake, it is necessary to determine where this lake will be. For example, the lake should be in the low-lying area adequately flanked by higher ground to prevent lake water from spilling over onto adjacent farm land, highways, etc. The mine cuts are laid out to accomplish this.

To facilitate land restoration, large tracts of mineable land are divided into smaller areas which are often, in turn, further subdivided into a series of blocks. In each of these blocks, the individual cuts are designed to allow for movement of the draglines and pipelines as mining progresses. At the same time, planners must keep in mind that the blocks must all fit as a unified tract of usable land when mining is completed.

Factors to be considered in this type of planning include total depth mined, ratio of overburden to total depth, reach of dragline, contour of area and adjacent property such as highways, lakes, homes and farms.

Figure 7 is a mining layout when reclamation is not considered. It would employ cuts 200 feet wide, based on a 175-foot dragline boom, and up to 2000 feet long. Overburden would simply be cast into an adjacent cut in the most convenient manner, usually in high windrows.

Figure 8 is a concurrent mining-reclamation layout that has been used in Central Florida to produce a particular type of landscape.

This method pivots small cuts around what will be a future lake. The overburden is distributed in previously mined cuts to approximately ground level. It then becomes a simple matter for bulldozers and scrapers to grade the overburden as desired.

Other types of landscape can be produced by different layouts.

This method is called the "concurrent" reclamation system because once the dragline is through with operations on a particular cut, bulldozers and scrapers can begin regrading. Thus, in any one mine, stripping and reclamation can take place concurrently.

If the land is maximized, the mined area would be approximately 2/3 land and 1/3 water. This ratio is variable

and is dependent upon the relative thicknesses of overburden and matrix. Water depth is also variable and is dependent upon the overburden: matrix ratio, placement of spoil and the depth to the base of the matrix.

Photo 7 is an aerial photo showing a mine before reclamation.

Photo 8 is an aerial photo showing the sumps shortly after reshaping.

After reshaping, the land is fertilized and revegetated. Examples of the uses of reclaimed phosphate land include: golf courses, sub-divisions, citrus groves, truck farms, pastures, Christmas tree farms, and commercial timber tracts.

Photos 9 and 10 are close-ups of mined areas before reclamation.

Photos 11 and 12 are closeups of reclaimed areas

Mined areas that are used as settling basins for sand tailings and colloidal minerals are more difficult to reclaim.

The washing and flotation methods used to produce phosphate rock unavoidably yield sand tailings and colloidal minerals (slimes). Neither material is commercial at this time, although at some future date the slimes will probably be valuable for their phosphate and uranium content. One-third of the phosphate originally contained in the matrix remains in the slimes.

The sand tailings and the slimes are disposed of in separate settling areas. The sand tailings dewater themselves in a short time. The problem with sand tailings is one of establishing vegetation.

The problem with colloidal minerals is their slow drying rate. The colloidal minerals are considered the more difficult problem. Slime settling areas have been used for pasture in about 5 to 20 years after abandonment, depending on type and design of storage structures. However, there is little possibility that such areas can ever be used successfully, even for light construction, and only with difficulty for intensive, row-crop farming.

One of the Central Florida phosphate mining companies has successfully mixed sand tailings with slimes to produce land surface having good bearing strength. Within a few days of completion it was supporting D-8 tractors and other heavy equipment. The area was fertilized with diammonium phosphate, then seeded with a mixture of Bermuda and Bahia grass. Germination and growth proved rapid.

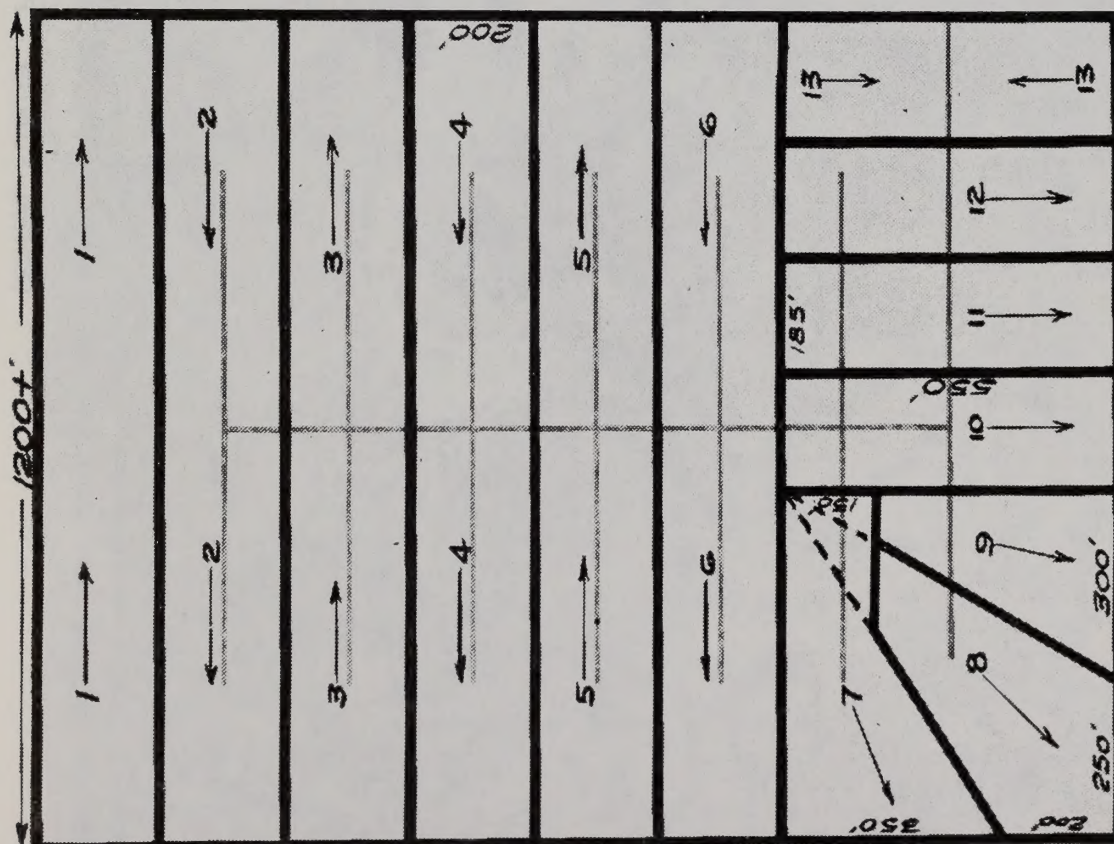
Mixing slimes with other materials, such as sand and overburden to speed up drying and to render the surface useful for purposes other than pasture, will make it more costly to recover the phosphates and uranium contained in the slimes at some future date if that need arises. Thus, slimes pose a difficult and challenging conservation choice.

Industry, the U.S. Bureau of Mines and the Tennessee Valley Authority have done much research and are continuing to do so in attempting to speed up the drying process. Some of the methods included mechanical dewatering through centrifuging and drying, electrophoretic dewatering, sedimentation with chemical or magnetic flocculents, electrical freezing, ion exchange, or solar evaporation. Some of these methods produce good results but the costs would be prohibitive.

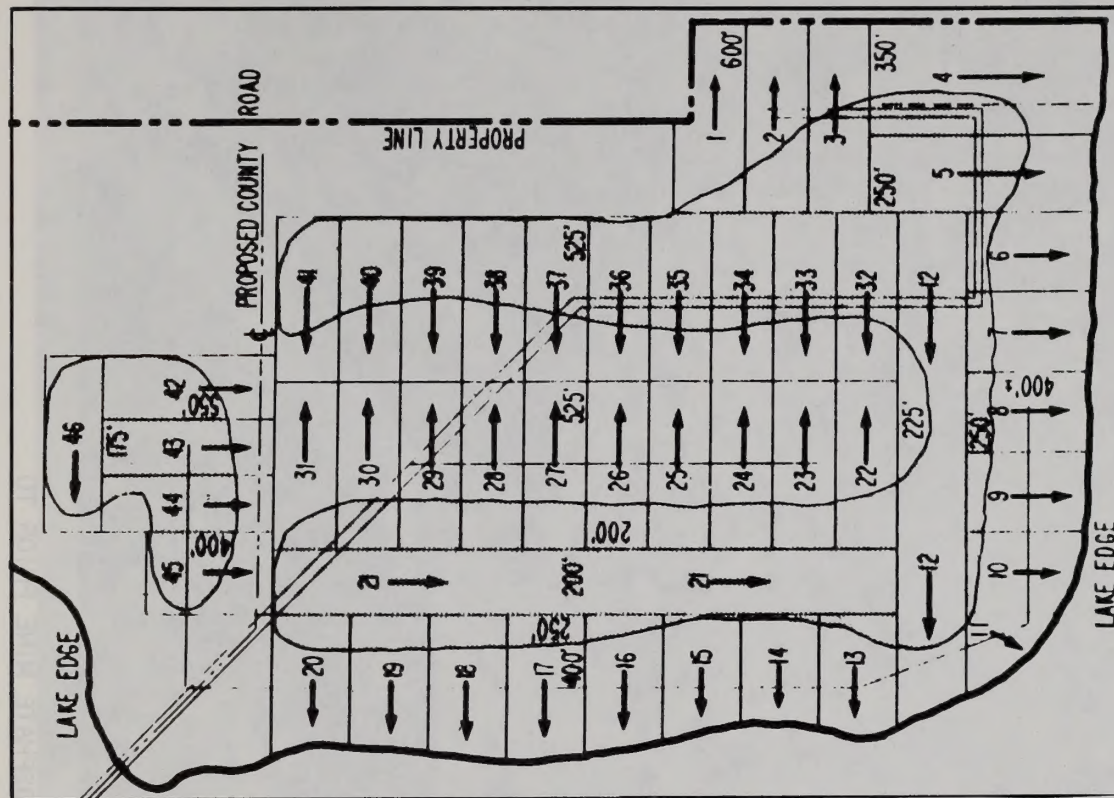
5. Process Descriptions

a. Washing and Flotation

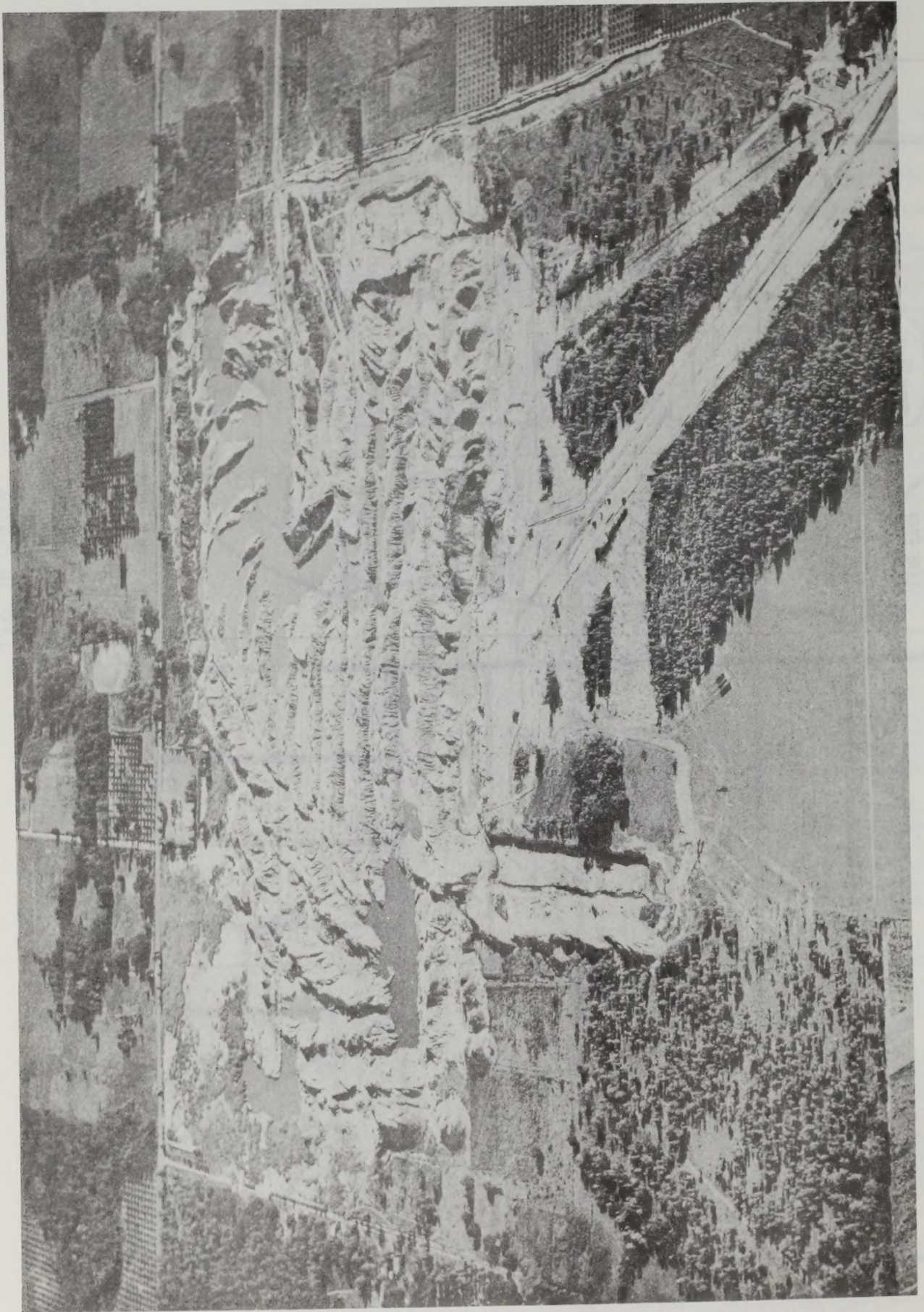
Washing and flotation methods differ slightly and are



A. MINING LAYOUT WHEN RECLAMATION IS NOT CONSIDERED. THIS MINING PLAN SHOWS THE LAYOUT OF CUTS. LIGHT COLORED LINES INDICATE PIPELINES. OVERBURDEN IS SIMPLY SPOILED INTO ADJACENT CUT IN LONG WINDROW.



B. SIMULTANEOUS RECLAMATION SYSTEM NOTICE HOW CUTS PIVOT AROUND BLOCK. ARROWS INDICATE DIRECTION IN WHICH OVERBURDEN IS SPOILED. OVERBURDEN IS DISTRIBUTED WITH LARGE DRAGLINE, AND IS CONCENTRATED TOWARD OUTSIDE OF AREA TO LEAVE LAKE IN CENTER.



CENTRAL FLORIDA - PHOSPHATE MINE PRIOR TO
RECLAMATION



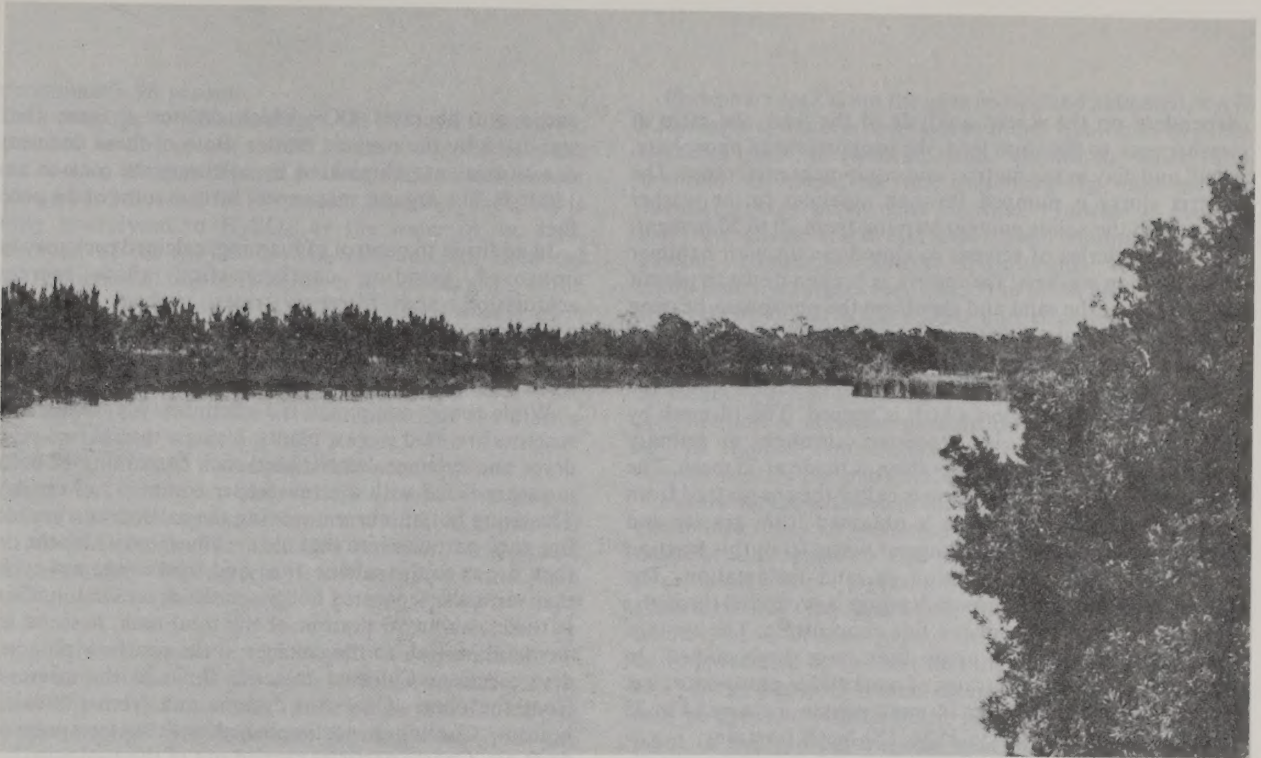
CENTRAL FLORIDA - AREA SHOWN IN PHOTO 7
SHORTLY AFTER RECLAMATION



MINED AREA BEFORE RECLAMATION



PARTIALLY RECLAIMED AREA CENTRAL FLORIDA



RECLAIMED AREA
WATER BODY APPROXIMATELY 10 YEARS AFTER MINING
CENTRAL FLORIDA



RECLAIMED AREA IN FOREGROUND LIGHT AGRICULTURAL USE
CENTRAL FLORIDA

dependent on the screen analysis of the feed, the ratio of washer rock to flotation feed, the proportions of phosphate, sand, and clay in the matrix, and equipment preference. The matrix slurry is pumped through pipelines to the washer plant with the solids content varying from 20 to 50 percent. Through a series of screens in closed circuit with hammer mills and log washers, the matrix is broken down to permit separation of the sand and clay from the phosphate-bearing pebbles. The final separation is usually made at 14 mesh. The washed, oversized pebble fraction is a final product, the screen undersize is dewatered and deslimed to separate the minus 150-mesh fraction which is wasted. The 14-mesh by 150 mesh fraction is processed through a primary classification section. A separation is made at 35 mesh. The minus 14 plus 35 mesh fraction is called the coarse feed from which a coarse concentrate is obtained from gravity and flotation processes. The tailings or waste from this fraction are used in dam construction or land reclamation. The minus 35-mesh plus 150-mesh fraction is processed through a flotation section to recover a fine concentrate. The waste, a sand, is pumped into areas that have been mined. In summary, three concentrates of marketable phosphate rock are produced: a ¾-inch by 14-mesh pebble, a coarse 14 by 35 mesh fraction, and a fine 35 to 150-mesh fraction.

b. Rock Drying

Phosphate rock for fertilizer is upgraded by washing and floating the apatites from the metal oxides in the matrix. Washed and piled rock may run 7 to 20 percent moisture.

The rock is usually dried before shipping to save freight cost, and is always dried before grinding. The maximum water content is specified as three percent by purchasers, but rock is normally dried to between one and two percent moisture.

Rotary gas or oil direct-fired parallel flow dryers are usually used but counter-current dryers are seen occasionally. Fluid bed dryers are frequently used in new installations. Relatively low drying temperatures are typical. The capacity of rotary dryers has grown from about 10 tons per hour to over 200 tons per hour. Capacity of dryers varies with the type and moisture content of rock.

c. Rock Grinding

Phosphate rock as mined and beneficiated is generally too coarse to be directly acidulated to phosphoric acid. The rock is processed to mechanically reduce it to the particle size for efficient phosphoric acid plant operation.

Size reduction is accomplished with ball, roll, or bowl type mills. Flow through the sizing and reclamation circuits is with pneumatic systems. Air is exhausted from the mill system to sweep the mill of moisture evaporated by the heat generated by grinding. Normally, the exhaust air passes through a bag type air cleaner to remove entrained rock particulates before discharge to the atmosphere.

d. Rock Calcining

In 1957 one or two percent of rock produced was "calcined," by 1967 about 12 percent, and in 1970 the fraction calcined probably exceeded 15 percent. Much of this treatment applies to Western United States rock which contains two to eight percent organic matter and a substantial carbonate content. Rock from other than Western sources, especially North Carolina (and not excepting Florida rock), may contain significant amounts of organic matter and carbonates. When reacted with acid, the

carbonate liberates CO_2 which creates a foam that is stabilized by the organic matter. Both of these undesirable constituents are eliminated by calcining the rock at about 1800° F. The organic matter will furnish some of the process fuel.

In addition to control of foaming, calcined rock may have improved grinding characteristics, show increased acidulation and filtration rates, reduce filter cloth maintenance, produce cleaner product acid, diminish sludge formation, produce cleaner concentrated acid, and improve the economics of using lower grade rock.

While rotary equipment is a common type, fluidized bed reactors are used in new plants. Using a typical two-section dryer and calciner, beneficiated rock containing 12 percent moisture is fed with a screw feeder to the top of the dryer. The rising hot air current leaving the calciner section blows fine rock particles into the cold cyclone from which the dried rock drops to the calcine zone and then to the hot cyclone that vents the separated hot gas to the dryer section. Coarse particles, about 90 percent of the total rock, descend from the dryer section to the calciner in the overflow pipe in the dryer section. Calcined material flows to the aftercooler from the cone of the hot cyclone and from the calciner bottom. Cooling is accomplished with water sprays and draft air. Coarse particles carried out of the cooler in the air stream are returned to the process from the cooler cyclone.

e. Sulfuric Acid

In the United States, sulfuric acid used to manufacture fertilizer is produced by the contact process. The process uses a catalyst surface to speed the oxidation reaction between sulfur dioxide (SO_2) and oxygen (O_2). This reaction occurs when the two gaseous components "contact" each other on the surface of a pelletized vanadium pentoxide catalyst to form sulfur trioxide (SO_3) gas. The sulfur trioxide (SO_3) gas is hydrolyzed with water to form sulfuric acid (H_2SO_4). The step is performed after the gas has passed through the catalysis stages. Exit gas from a "single absorption" stage generally contains sulfur dioxide (SO_2) at a concentration of 2000 mg/l (ppm) or greater, which exceeds the EPA standard of 1.81 kg (4.0 pounds) per ton 100 percent acid produced. Since 1971 a process modification will allow compliance to the EPA standard. The modification is the addition of a second absorption step and is known as the "double absorption" process. All future plants will utilize the "double absorption" principle.

The raw materials used to produce sulfuric acid by the contact method are elemental sulfur, air, and water. Molten elemental sulfur is sprayed into a dry air stream inside a furnace. The elevated furnace temperature auto-ignites the atomized liquid sulfur to burn (oxidize) it to sulfur dioxide (SO_2). This oxidation reaction releases a large quantity of heat which causes the temperature of the SO_2 excess air mixture to rise to 1800-2000° F as it exits from the furnace. The heated gas mixture flows to a boiler for heat removal. Sufficient heat is removed to reduce the gas mixture temperature to the initial physical chemistry condition necessary for optimum chemical conversion of SO_2 to sulfur trioxide (SO_3).

Conversion of SO_2 to SO_3 takes place in a series of three or four steps. Each conversion step takes place under a separate physical chemistry condition to achieve the most complete conversion of SO_2 to SO_3 possible. This conversion efficiency in a single absorption process is

approximately 98 percent.

Following the conversion stages, the SO_3 gas flows to the bottom of an absorption tower. In the tower the SO_3 gas flows upward through ceramic packing and counter-current to downward flowing 98-99 percent H_2SO_4 . The SO_3 is readily hydrolyzed to H_2SO_4 by the water in the acid. Hydrolysis of the SO_3 to H_2SO_4 also releases chemical heat. A portion of this heat increases the temperature of the enriched 98-99 percent H_2SO_4 acid. After the acid exits from the tower it flows through cooling coils to remove the temperature increase and then to the pump tank. From this tank it is again recycled over the absorption tower.

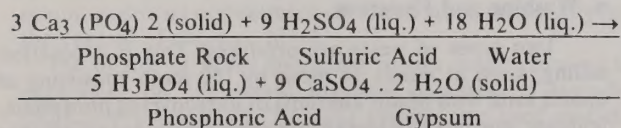
In the process discussion it was noted that the molten sulfur is burned in a dry air stream. The drying of atmospheric air used in the process is accomplished in the drying tower. Here moist atmospheric air enters the base of the tower and flows upward counter-current to acid pumped from the pump tank. This acid has, however, been diluted from the normal 98-99 percent H_2SO_4 acid concentration in the pump tank to approximately 93 percent. The moist air, 93 percent acid content, removes moisture from the air stream yielding dry air and a slightly further diluted 93 percent acid. In turn, the dry air flows to the furnace and the diluted 93 percent flows back to the pump tank for mixing with the stronger 98-99 percent flowing back from the absorption tower.

Product acid is that acid quantity flowing into the pump tank which is in excess to drying and absorbing tower recycle requirements. Adjustments to the rate of product acid removal from the pump tank are determined by the monitoring of pump tank level and maintaining it at a constant level. The excess (product) acid is diluted with water to the desired product acid concentration (normally 93 percent H_2SO_4) before it is pumped to storage.

It is most likely that all new plants constructed in the United States will be "double absorption" process units. The feature which makes this process different from the single absorption process described above is the addition of a second absorption tower. This second tower is installed at a point intermediate between the first and final SO_2 to SO_3 catalytic conversion steps. Utilization of this second absorption tower permits greater SO_2 conversion to SO_3 and a significantly reduced quantity of SO_2 in the plant effluent gas stream. Double absorption plants show SO_2 conversion efficiencies of 99.5+ percent as compared to single absorption plant efficiencies of approximately 98 percent. Both processes have the same water effluent in respect to both quantity and contaminant levels.

f. Phosphoric Acid

The raw materials in this process are ground phosphate rock, 93 percent sulfuric acid, and water. Phosphate rock is mixed with the sulfuric acid after the acid has first been diluted with water to a 55-70 percent H_2SO_4 concentration. This mixing takes place in an attack vessel of a size sufficient to retain the raw material mixture for several hours. The simplified overall chemical reaction is represented by the following equation:



Phosphate rock is not the pure compound indicated, but is a fluorapatite material containing minor quantities of other elements such as fluorine, iron, aluminum, silica, and uranium. Of these, the one presenting the most serious overall process problem is fluorine. Fluorine is evolved from the attack vessel and other plant equipment as the gaseous compound silicon tetrafluoride (SiF_4). This compound hydrolyzes very quickly in moist air to fluosilicic acid (H_2SiF_6) and silica (SiO_2) and is collected in a wet scrubber unit.

An additional quantity of the fluorine remains in the byproduct gypsum as a variety of fluorine compounds. The combination of collected gaseous fluorine effluent and the soluble fluorine compounds in the gypsum are a major contaminant in the phosphoric acid plant effluent streams.

Following the reaction in the attack vessel, the mixture of phosphoric acid and gypsum is pumped to a filter. The filter mechanically separates the particulate gypsum from the phosphoric acid (approximately 30 percent P_2O_5 concentration). The magnitude of this operation and the quantity of by-product gypsum to be handled and stored is best appreciated by the fact that the production of each ton of P_2O_5 as phosphoric acid creates approximately five (5) tons of gypsum. Normally the gypsum is sluiced from the plant to the gypsum disposal area utilizing contaminated water as the sluicing medium. The phosphoric acid separated from the gypsum is collected for further processing.

Phosphoric acid produced in the sulfuric acid acidulation process is generally of too low a concentration to qualify as either a salable product or for processing to a final dry fertilizer product. Acid from the acidulation plant is normally in the 26-30 percent P_2O_5 concentration range. This P_2O_5 level can be increased by processing the acid through evaporator units to increase the P_2O_5 level to the 40-54 percent P_2O_5 range. Concentration is achieved by evaporating water from the acid. Phosphoric acid concentration to 54 percent P_2O_5 is accomplished in evaporators with low pressure steam as the heat source to evaporate water from the acid. Evaporator units effect evaporation by circulating acid at a high volume rate consecutively through a shell and tube heat exchanger and flash chamber under vacuum pressure. The flash chamber provides a comparatively large liquid surface area where water vapor can be easily released without significant phosphoric acid entrainment losses. Inherent with water evaporation is volatilization of minor acid impurities. The principal one is fluorine. The evolved fluorine, together with very minor quantities of phosphoric acid, passes to a barometric condenser and contaminates the condenser water.

Phosphoric acid after concentration to a 52-54 percent P_2O_5 level becomes a supersaturated solution to iron and aluminum phosphates, soluble gypsum, and fluosilicates. These impurities are present in quantities sufficient to create an appreciable solids accumulation during acid storage. In turn this causes tank car unloading and customer processing problems. It is, therefore, necessary to remove these precipitated impurities before the acid can be considered a salable product.

The process for removal of precipitated solids from 54 percent P_2O_5 content, is a high analysis phosphatic fertilizer.

treatment of the acid. Treatment consists of conditioning the acid with temperature and time necessary to obtain the degree of solids precipitation required to meet the clarified acid product specifications. The precipitated impurities are separated from the acid by settling and/or centrifuging.

g. Superphosphoric Acid

Orthophosphoric acid produced by the wet process may be dehydrated to P_2O_5 concentrations ranging from 67 to 72 percent. The 72 percent acid is near its freezing point and is kept warm during shipping and handling and contains 30 to 50 percent of the nonortho forms: pyro-, tetrapyro-, and tripolyphosphoric acids.

Wet process acid (54 percent P_2O_5 or less) is concentrated by vacuum evaporation by all producers except by three operators of a thermal evaporation technique known as "submerged" combustion.

A typical vacuum evaporator for superphosphoric acid is similar in principle to the "concentrator:" that produces the 54 percent phosphoric acid feed stock. The temperature necessary to produce superphosphoric acid is considerably higher.

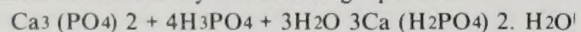
h. Triple Superphosphate

Triple superphosphate (TSP), with 48.5 percent - 46.0 percent P_2O_5 content, is a high analysis phosphatic fertilizer.

This product has in the 1950-1965 period taken over much of the market lost by normal superphosphate and currently accounts for approximately 24 percent of the total phosphatic fertilizer market. TSP's share of the market for the near future is expected to remain relatively constant because of the tremendous growth of ammonium phosphates. TSP production is most economically produced close to the phosphate rock source. At present, 83 percent of the total production is manufactured in Florida.

There are two principal processes for manufacturing TSP. One produces a material designated as Run-of-Pile (ROP) and the product from the second process is called Granular Triple Superphosphate (GTSP). Physical characteristics and processing conditions of the two materials are radically different. ROP material is essentially a non-uniform pulverized material which creates difficult air pollution problems in manufacture, as well as difficult materials handling problems in shipment. GTSP is a hard, uniform, pelletized product. The process equipment permits collection and treatment of dust and obnoxious fumes. Most new plants will be the GTSP type.

Both processes use the same raw materials, ground phosphate rock and phosphoric acid. The basic chemical reaction is shown by the following equation:



Phosphate Rock	Phosphoric Rock	Water	Triple Superphosphate (Monocalcium Phosphate)
-------------------	--------------------	-------	--

At this point the similarity between the two processes ends and it is necessary to describe each process separately.

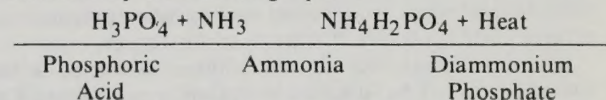
The ROP process uses phosphoric acid. Mixing the 46-54 percent P_2O_5 phosphoric acid and phosphate rock is accomplished in a cone mixer. The cone depends on the inertial energy of the acid for mixing power. On discharge from the mixer the slurry quickly (within 15 to 30 seconds) becomes plastic and begins to solidify. Solidification, together with the evolution of much obnoxious gas, takes place on a slow-moving conveyor enroute to the curing area. The solidified material takes on a honeycomb appearance because of the gas evolution throughout the mass. At the

point of discharge from the conveyor, the material passes through a rotary mechanical cutter which breaks up the honeycombed ROP before it discharges onto the storage curing pile. Curing occurs in the storage pile and takes 2-4 weeks before the ROP is ready to be reclaimed from storage, sized, and shipped.

GTSP is produced quite differently. The phosphoric acid in this process is appreciably lower (40 percent P_2O_5) than the 46-54 percent P_2O_5 acid used in ROP manufacture. Forty percent P_2O_5 acid and ground phosphate rock are mixed together in a tank. The lower strength acid maintains the slurry in a fluid state and allows the chemical reaction to proceed appreciably further toward completion before it solidifies. After a mixing period of 1-2 hours the slurry is distributed onto recycled dry GTSP material. This distribution and mixing with the dry GTSP take place in either a pug mill or rotating drum. Slurry wetted GTSP granules discharge into a rotary dryer where the chemical reaction is accelerated and excess water evaporated. Dried granules from the dryer are sized on vibrating screens. Over- and undersize granules are separated and recycled. Product-size granules are cooled and conveyed to storage or shipped.

i. Ammonium Phosphate

The two primary raw materials used to produce ammonium phosphates are ammonia and wet process phosphoric acid. The various grades vary only in the amounts of nitrogen and phosphate present. It is primarily the nitrogen that varies and this is accomplished by controlling the degree of ammoniation during neutralization of the phosphoric acid. The chemical reaction involved is indicated by the following equation:



The processing steps are essentially identical to those described in the triple superphosphate GTSP process. Ammonia, either gaseous or liquid, is reacted with 30-40 percent P_2O_5 phosphoric acid in a vertical cylindrical vessel which may or may not have mechanical agitation. The slurry is pumped to a mixer where it is distributed on dry recycled material. Distribution and mixing take place in either a pug mill or rotating drum. Wetted granules discharge into a rotary dryer where the excess water is evaporated. Dried over- or undersize granules are separated for use as recycle material. Product-size granules are cooled and conveyed to storage or shipped.

6. Process Waste Characterization

The intent of this section is to describe and identify the water usage and waste water flows in each chemical and physical process. The unit processes, washing and flotation, sulfuric acid, phosphate rock grinding, wet process phosphoric acid, phosphoric acid clarification, triple superphosphate, and ammonium phosphates, have the following types of water usage and wastes.

a. Washing and Flotation

Two types of waste are produced. One is a flotation tailing, sized at minus 14 mesh by 150 mesh consisting of quartz sand with minor amounts of unrecovered phosphate, feldspar, and heavy minerals; the other wastes are slimes that characterized as minus 150-mesh clay, phosphate, and

quartz. The 14 by 150-mesh flotation tailings, because of their size and freedom from organic matter, are used to construct dams around slime settling ponds. When returned to mined-out areas, they settle and dewater rapidly and the area is suitable for reclamation. In the central phosphate fields of Florida, one ton of sand tailings is produced with each ton of marketable phosphate rock. The minus 150mesh phosphatic clay, phosphate, and quartz slimes are a disposal problem. About one ton of nontoxic slimes is produced with each ton of marketable phosphate rock from central Florida operations. The slimes are pumped back into the mined-out areas and in some instances are assisted by gravity flow. Slimes leave the processing plant at 2 to 5 percent solids, settle rapidly to 10 to 15 percent solids, and after several years achieve equilibrium with 25 to 35 percent solids. Because of the colloidal characteristics of the slimes, even after years of settling, they occupy a volume nearly six times greater than the original clay volume and nearly twice the volume of the original matrix. In the central Florida area, approximately 60 to 70 percent of the mined-out areas is enclosed to hold the waste slimes. The remaining percent of the land may be reclaimed immediately after mining. Washing and flotation plant wastes are controlled to recover process water and prevent slimes from fouling natural waters. Available data indicates that the phosphate ore matrix of northern Florida contains less clay than the average in central Florida (Issue: a, Section IX). It is estimated that only 40 percent of the mined area will be required for slime settling ponds in the northern fields compared with 70 percent in the central area.

b. General

(1) Water treatment plant effluent

Includes raw water filtration and clarification, water softening, and water dionization. All these operations serve to condition the plant raw water to the degree necessary for process water and steam generation.

(2) Closed loop cooling tower blowdown

(3) Boiler blowdown

(4) Contaminated water

(5) Process water

(6) Spills and leaks

(7) Nonpoint source discharges

These include surface waters from rain or snow that become contaminated.

(8) Contaminated water (gypsum pond water) treatment

Each of the above listed types of water usage and wastes is identified as to flow and contaminant content under separate headings as follows:

(1) Water treatment plant effluent

Basically, only the sulfuric acid process has a water treatment effluent. This 310-400 gal/ST effluent stream consists of the impurities removed from raw water plus minor quantities of treatment chemicals, used principally for the control of pH (e.g., lime).

The degree of water treatment of raw water required is dependent on the steam pressure generated. Generally medium-pressure (125-750 psig) systems are used and do require rather extensive make-up water treatment. Hot

lime-zeolite water treatment is the most commonly used.

There are phosphate complexes, particularly along the Mississippi River, which use river water both for boiler make-up and process water. In these plants it is necessary to treat the river water through a settler or clarification system to remove the suspended solids present in the river water before conventional water treatment is undertaken. Therefore this pretreatment step may have a separate waste effluent stream carrying the suspended solids removed from the raw river water. The flow quantity of this stream is dependent on the amount of solids in the raw water and the solids concentration.

(2) Closed loop cooling tower blowdown

The cooling water requirements and normal blowdown quantities are listed in the following table:

Process	Cooling Water	
	Circulation Requirement (Gallons/Short Ton)	Discharge Requirement (Gallons/Short Ton)
Sulfuric Acid (per ton 100% H ₂ SO ₄)	18000-20000	400-600
Rock Grinding (per ton rock)	8-150	8-150*
Phosphoric Acid (per ton P ₂ O ₅)	0-4500	0-4500
Pho A. Cone (per ton P ₂ O ₅)	None	None
Phos. A. Clarification (per ton P ₂ O ₅)	165-770	165-770*
Triple Super (per ton product)	None	None
Ammon. Phos. (per ton product)	None	None

*Noncontaminated--only temperature increase in discharge water.

Closed loop cooling systems function with forced air and water circulation to effect water cooling by evaporation. Evaporation acts to concentrate the natural water impurities as well as the treatment chemicals required to inhibit scale growth, corrosion, and bacteria growth.

Cooling systems require routine blowdown to maintain impurities at an acceptable operating level. The blowdown quantity will vary from plant to plant and is dependent upon overall cooling water circulation system.

The quality of the cooling system blowdown will vary with the make-up water impurities and inhibitor chemicals used.

The type of process equipment cooled has no bearing on the effluent quality. Cooling is by an indirect (no process liquid contact) means. The only cooling water contamination from process liquids is through mechanical leaks in heat exchanger equipment. Contamination does periodically occur and continuous monitoring equipment is used to detect such equipment failures.

The table below lists the normal range of contaminants that may be found in cooling water blowdown systems:

Contaminant	Concentration
	(both mg/ l and ppm)
Chromate	0-250
Sulfate	500-3000
Chloride	35-160
Phosphate	10-50
Zinc	0-30
TDS	500-10000
SS	0-50
Biocides	0-100

Cooling tower blowdown can be treated separately or combined with other plant effluents for treatment. the method employed is dependent upon the chemical treatment method used and the quality of the receiving waters. those plants which utilize chromate or zinc treatment compounds generally treat the blowdown stream separately to minimize treatment costs.

(3) Boiler blowdown

The only steam generation equipment in a phosphate complex other than possibly auxillary package boilers is in the sulfuric acid plant. Medium pressure (125-750 psig) steam systems are the most generally used.

Boiler blowdown quantities are normally 310-400 gal/ St. Typical contaminate concentration ranges are listed.

Contaminate	Concentration
	(both mg/ l and ppm)
Phosphate	5-50
Sulfite	0-100
TDS	500-3500
Zinc	0-10
Alkalinity	50-700
Hardness	50-500
Silica (SiO ₂)	25-80

(4) Contaminated water (gypsum pond water)

Contaminated water is used to supply essentially all the water needs of a phosphate fertilizer complex. The majority of phosphate fertilizer installations impound and recirculate all water which has direct contact with any of the process gas or liquid streams. This impounded and reused water accumulates sizable concentrations of particularly F and P. Concentrations of 8500 mg/ l (ppm) F and in excess of 5000 mg/ l (ppm) P are not unusual. Acidity of the water also reached extremely low levels (1-2ph). This poor quality water means that the process equipment materials of construction be compatible with the corrosive nature of the water.

Contaminated water is used in practically all process equipment in the wet process phosphoric, phosphoric acid concentration, triple superphosphate, and ammonium phosphate processes; all phosphate processes except sulfuric acid and rock grinding. The water requirements of major water using equipment as barometric condensers, gypsum sluicing, gas scrubbing equipment, and heat exchangers are all supplied by contaminated water. Each time the water is reused the contaminate level is increased. While this contaminated water is a major process effluent, it is not discharged from the complex. The following table lists ranges of contaminated water usage for each process.

Process	Consumption
	(Gallons/ Short Ton)
Sulfuric Acid	None
Rock Grinding	None
Wet Process Phosphoric Acid	3800-5000
Phosphoric Acid Concentration	550-570
Phosphoric Acid Clarification	225-250
Triple superphosphate	158-250
Ammonium Phosphate	1200-1500

(5) Process water

Process water in a phosphate complex is defined as fresh water untreated except for suspended solids removal. Normally, fresh water use to all process units is held to an absolute minimum. Such restraint is necessary because all process water used finds its way into the contaminated water system. Excessive fresh water use will needlessly increase contaminated water inventory beyond the contaminant capacity. This, in turn, means contaminated water must undergo costly treatment before discharge to natural drainage.

Normal ranges of process water use are listed below for each of the process units. There is no discharge except into a process stream or to the contaminated water system.

Process	Usage
	(Gallons/ Short Ton)
Sulfuric Acid	15-20
Rock Grinding	None
Wet Process Phosphoric Acid	None
Phosphoric Acid Concentration	.2-.4
Phosphoric Acid Clarification	None
Triple Superphosphate	None
Ammonium Phosphates	None

(6) Spills and leaks

Spills and leaks in most phosphate fertilizer process units are collected as part of the housekeeping procedure. The collected material is, where possible, reintroduced directly to the process or into the contaminated water system. Spillage and leaks, therefore, do not normally represent a direct contamination of plant effluent streams that flow directly to natural drainage.

(7) Nonpoint source discharges

The primary origin of such discharges is the combination of dry fertilizer material dusting over the general plant area and then being solubilized by rain or melting snow. The magnitude of this contaminant source is a function of dust containment, housekeeping, snow/ rainfall quantities, and the design of the general plant drainage facilities. No meaningful data was obtained on this intermittent discharge stream.

(8) Contaminated water (gypsum pond water) treatment system

The contaminated water treatment system discharge effluent is the only major discharge stream from a phosphoric acid complex other than the water treatment and blowdown streams associated with the sulfuric acid process. Discharge from this system is kept to an absolute minimum due to the treatment cost involved. In fact, several

complexes report that they have not treated and discharged water for several years. The need to treat and discharge water has been previously alluded to as dependent upon the contaminated water inventory. As a result, water is not discharged from the treatment system continuously throughout the year. Once the necessity for treatment occurs, however, the flow is continuous for that period of time required to adjust the contaminated water inventory. Normally, this period is 2-4 months per year, but is primarily dependent on the rainfall/evaporation ratio and periods of concentrated rainfall such as an abnormal rainy season or a hurricane.

The quantity of water discharged from the contaminated water treatment system is dependent upon the design of the treatment system and has no direct connection to production tonnage. Contaminated water treatment systems generally have capacities of 500-1000 gpm.

The treatment system is a two-stage liming process. Three main contaminated water constituents, namely pH, F, and P, are reduced to concentrations compatible with the receiving water body. Concentration ranges for these three main contaminants after treatment are:

pH	6-9
F	15-40 mg/l (ppm)
P	30-60 mg/l (ppm)

Rock drying

The primary emission points of particulates from rock drying are the stack at the gas-discharge end of the dryer, together with any uncontrolled escape of dust during transport or storage of dried product.

Wastes are passed through the process cyclone and a gravitational spray tower in which the gas is scrubbed with water to effect abatement or particulate emission by about 93 percent. If the dryer is operated on sulfur-bearing fuel, the SO₂ emission is uncontrolled.

Rock grinding

Phosphate rock size reduction in all fertilizer plants involves dry processing circuits and not liquid streams. Minor quantities of water are used for indirect cooling of lubricating oil and bearings.

Future rock grinding operations may utilize wet grinding circuits rather than the dry grinding practice. This change may be promoted by lower capital costs and the elimination of the gas effluent streams associated with both the rock drying and grinding operations.

Closed circuit grinding is a system of continuous throughout modified by recycle of the oversize material leaving the mill.

The entire output of the mill is airborne to the classifier which separates the oversize and returns this fraction to the mill. Material ground to size is collected in the cyclone and flows to storage. The conveying air, except for a small bleed portion, is returned to the mill to "close" the circuit.

In addition to the normal dusting tendency of fine, dry material in motion, particulate emission occurs as follows:

The dry rock fed to the mill may contain 1.5 to 2 percent combined water and 1 to 3 percent free water that is partially vaporized during grinding. To prevent the conveying air from becoming saturated, a portion is vented and replaced with ambient air. The output of the mill fan and the storage silo are convenient sources for this bleed air. A typical control system is a bag filter or a scrubber. A bag filter will give excellent particulate control, very nearly 100 percent

efficiency with good maintenance and humidity control. typical operation is judged to be 99 percent efficient.

Calcining

Typical emission controls on the waste gas stream are venturi scrubbers on low-energy operation using gypsum pond water. If sulfur is present in the fuel, the discharge from the scrubber will contain all the sulfur as oxides. The pond water will wet out an estimated 99 percent of the rock particulates and absorb 90 percent of the fluorides. The latter are released from the rock at calcining temperatures as gases, HF and SiF₄, in small amounts and variable proportions depending on the temperature reached and the rock composition.

Phosphoric acid

About 60 percent of the fluorine in the rock is estimated to be converted to hydrofluoric acid, which in turn, reacts with the silica in the rock to form fluosilicic acid. The remaining 40 percent of the fluorine either remains insoluble or reacts to produce a solid that is removed from the acid with the gypsum.

The fluosilicic acid, while quite soluble in water, will vaporize readily from a hot solution. The vapor immediately decomposes to the gases hydrogen fluoride and silicon tetrafluoride. These are the only gaseous fluorides emitted from rock processing.

About 5 to 7 percent of the fluorine converted to fluosilicic acid is volatilized to gaseous fluorides in the digester and drawn off with the vent gases. Carbon dioxide in uncalcined phosphate rock is volatilized when the rock is acidulated and passes out with the digester vent gases. These gases are usually exhausted through a scrubber to the atmosphere.

A small quantity of phosphate rock dust may become airborne during handling and feeding the digester. Whenever the physical arrangement of the rock grinding and phosphoric acid plants permit, the conveying and weighing equipment is exhausted by the mill vent air system. Otherwise, a collector is installed on the rock bin to collect this dust before discharge.

A small amount of fluoride is volatilized during the vacuum cooling used to control the reaction temperature and is collected in the barometric condenser of the cooling system.

The main evolution of fluorides during the processing takes place in the concentrator where the phosphoric acid strength is increased from 30 percent P₂O₅ to 40-54 percent P₂O₅, depending on the end use, and 15 to 50 percent of the fluorine in the rock feed is released. At this point the "Swift" or "Swenson" systems are sometimes used for recovering fluorine as a marketable 15 to 25 percent water solution of fluosilicic acid. If the Swift or Swenson system is not used for recovery, the fluosilicic acid is usually delivered to the gypsum pond with the condenser water.

Other less significant points of emission in wet process phosphoric acid plants are the hot slurry, filter feed, filtrate hot wells, intermediate and product acid storage tanks, or open launder used to convey slurry or acid. Fumes from these sources, if not collected and scrubbed, will contribute to air pollution, but most modern installations furnish exhaust systems to control the secondary as well as the primary fluoride emissions.

Pond water scrubbers for both high and low fluoride concentration streams are used for typical control systems.

The low fluoride concentration stream is scrubbed at low energy in a spray tower to remove about 99.3 percent of the fluorides in the streams. The high fluoride concentration stream is treated at moderately high energy in a cross-flow scrubber to remove 99.8 percent of the fluorides.

Phosphate rock processing facilities include pond or "lagoon" acreage for:

- (1) Sedimentation of solids from scrubber water and filter backwashes, especially gypsum filter cake from the wet phosphoric acid process.

- (2) Cooling of scrubber and condenser water.

- (3) Neutralization of acidic waste waters.

Usually the pond water is recirculated. Water losses are from evaporation, percolation, and overflow in mixtures with storm water. Gypsum is dredged from the bottom to raise the level of dikes to continue confinement of the pond. A typical gypsum pond may evolve as much as 5 pounds of fluorine as fluorides per day per acre of pond surface.

Altogether the pond receives an estimated 80 percent of the fluorine in the phosphate rock charged to processing, and some of this undoubtedly escapes in the form of HF and SiF₄ gases from decomposition of fluosilicic acid. The rates of evolution of these gases are mass transfer phenomena and are controlled by the area of the air/pond interface, concentration in each phase, air and water temperatures and other factors.

Pond construction varies according to terrain and subsoil, and pond area required. As to the latter, a ratio of about two-fifths acre per daily ton of P₂O₅ in the form of wet process acid, is usual.

Evidence indicates that about 99 percent of the fluorides are insoluble and are collected in the bottom sediments or remain dissolved in the liquid phase.

Superphosphoric acid

Since the vacuum evaporator is nearly a closed system operation on low-fluorine raw material, the emission quantity is not great. Fluorine evolved during concentration of the acid is washed into the seal tank of condensate from steam to the jets and cooling water. This condensate drains to waste, but a small evolution of fluorine of the order of a few thousandths of a pound per ton P₂O₅ processed, may occur.

The Submerged Combustion Process creates a high turbulence in the acid that loads the saturated exit gas with phosphoric acid mist and a proportionate amount of fluorides. The mist is usually well knocked out in baffle chambers and the water-bearing exit gas is water scrubbed if mist is still present.

Triple superphosphate

The evolution of fluorides and particulate matter from this process is controlled with low-energy scrubbers in series, using gypsum pond water to effect 99 percent control of fluorides and 97 percent control of particulates. Particulates are reduced to rather low concentration by process cyclones prior to the tail gas scrubbers.

Ammonium phosphate

The fluorine content of the phosphoric acid, approximately 2.2 percent in 39 percent wet process acid, is

released by neutralization to a significant degree. This release occurs through several steps of processing.

Production of the favored diammonium phosphate requires continued addition of ammonia through the partially dry, solid phase; that is, in most procedures, continued ammonia gas feed to reactors and granulator of whatever type. Ammonia gas absorption in the solids is not very efficient and the unabsorbed ammonia is normally cycled back to be washed out by the incoming phosphoric acid as a usual feature of processing. The "fume scrubber" is primarily for this purpose but ammonia is also present with dust from drying and handling the solids. Frequently, three venturi scrubbers are installed to provide separate control of the streams from preneutralization and granulation.

7. Additional Process Control

The intent of this section is to describe and identify additional controls of the emissions and effluents for each operation.

Washing and Flotation

Washing and flotation plants are wet processing operations and, as such, do not change the quality of the air around the plants. The products are shipped to other locations for further processing and the waste fractions are returned to the mining areas for storage, dam buildings, land reclamation, and reclamation of contained water.

The design and construction of peripheral dams around the mined-out areas, regardless of the size required, must be engineered to prevent breakouts if control of the slimes, generated by the beneficiation of the matrix, is to be assured.

If retained in the mined-out areas or slime ponds, neither tailings nor slimes affect air or water quality in adjacent areas. The mined-out areas on the central part of the State are, after creation of dams and ponds, of little useful value unless reclaimed. If the 30 percent of this land not designated as slime ponds is not surrounded by either active or inactive ponds, it is possible to redevelop the land by back-filling to natural levels with coarse tailings and overburden, to the degree this material is available, and create lakes when material for fill is not available. Some slime settling ponds that were active in the early days of phosphate rock mining in the State probably contain the coarse tailings as well as the slimes and have been reclaimed for useful purposes. These ponds do not represent the composition of those currently being formed. Procedures and specifications for slime ponds and retention dams must be established to assure that this material will not break out to flood adjacent land and choke natural drainage streams. Pollution abatement measures are valueless after a slime pond breakout.

Rock Drying

Additional air and water controls are not needed for the rock drying process.

Rock Grinding

Additional air and water controls are not needed for the rock grinding process.

Calcining

With high efficiency control technology, fluorides are controlled at 99.6 percent efficiency and particulates at better than 99.9 percent. Sulfur oxide emission is

eliminated if sulfur-free fuel is used.

Water controls are not needed for the calcining process.

Sulfuric Acid

The "double absorption" process is a modification for emission control. The converter gas, rich in SO_3 , is sent to the first absorption tower and then back to a final section of the converter. The SO_3 from the second conversion is then sent to a second absorption tower in which the SO_3 emission is reduced to a final level of four pounds per ton H_2SO_4 . Most of the SO_3 mist is trapped in a mist filter.

A sulfuric acid plant has no inherent water pollutants associated with the actual production of acid. An indispensable part of the process, however, is heat removal. This heat removal is accomplished with steam generating equipment and cooling towers. Both of these cooling methods require blowdown and subsequent disposal to natural drainage. The amount and degree of impurities discharged vary widely with the raw water quality.

An inherent hazard of any liquid handling process is the occurrence of an occasional accidental break and operator error. In a sulfuric acid plant the sulfuric acid cooling coils are most prone to an accidental break. On these occasions the cooling tower water quickly become contaminated. In turn, the normally acceptable cooling tower blowdown stream becomes contaminated. The described treatment facility is designed to take care of this eventuality and protect the natural drainage waters.

A reliable pH or conductivity continuous monitoring unit is installed on the plant effluent stream (preferably the combined plant effluent stream but at least on the cooling tower blowdown). A second part of the system is a retaining area through which non-contaminated effluent normally flows. This retaining area can be any reasonable size but should be capable of retaining six to twelve hours of the normal plant effluent stream. The discharge point from the retaining area requires a means of positive cutoff, preferably a concrete abutment fitted with a valve. A final part of the system is optional. For example, the retaining area can be provided with lime treatment facilities or any means of moving water from the retaining area to a contaminated water holding area.

When an acid break is detected by the water monitoring instrument, located at the inlet of the cooling tower, an alarm is sounded. It is preferable to have the instrument automatically activate the positive cut-off at the discharge of the retaining area, although this can be done manually. Activation of this system causes a plant shutdown to locate the failure and start corrective work. The contaminated water in the retaining area must either be neutralized in the pond or moved to a contaminated water storage area where it can be stored or neutralized through a central treatment system.

A system can be designed to provide continuous protection of natural drainage waters as well as correct a process failure. The primary factor to control is pH. Sufficient neutralization to raise the contaminated water pH to six is required. Neutralization is accomplished with lime. Lime serves not only to neutralize the hydrogen ion concentration but also removes the sulfate (SO_4) contaminant as an insoluble calcium sulfate.

Phosphoric Acid

A high efficiency control system, consisting of three stages of low-energy scrubbing using neutralized pond water, is estimated to remove about half the fluorides that escape with present practice.

There is no technology available for the capture of fluoride gases evolved from the surface of a pond. However, control of this emission can be exerted by a "process change" whereby the input to the pond is made alkaline, most practically by an excess of lime.

All phosphate complex process effluents (contaminated water) are collected and impounded. The impoundment area (ranging in size from 160 to 1,400 acres) serves two functions. One function is as a storage area for storage of waste by-product gypsum from the phosphoric acid process. The second is as an area for atmospheric evaporative cooling of the contaminated water prior to its reuse back in the various process units. This overall system functions as a closed-loop system the majority of the time. The time interval that it can function as a no discharge closed-loop system is dependent on the quantity of fresh water addition it can accept before water storage capacity is filled.

Once the storage area approaches capacity, it is necessary to begin treating the contaminated water for subsequent discharge to natural drainage bodies.

Contaminated water can be treated effectively for control of the pollution parameters, namely -- pH, phosphate, and fluorides. Treatment is by means of a "double liming" or two-stage lime neutralization procedure.

Two stages of liming or neutralization are necessary to effect an efficient removal of the fluoride and phosphate contaminants. Fluorides are present in the water principally as fluosilicic acid with small amounts of soluble salts as sodium and potassium fluosilicates. Phosphates are present principally as phosphoric acid with some minor amounts of soluble calcium phosphates.

The first treatment stage provides sufficient neutralization to raise the contaminated water containing up to 9000 mg/l (ppm) F and up to 6500 mg/l (ppm) P from 1-2 to 3.5-4.0 level. The treatment effectiveness is, to a significant degree, dependent on the mixing efficiency at the point of lime addition and the effectiveness of the pH control. At this pH level the fluorides will precipitate principally as calcium fluoride.

This mixture is then retained in a quiescent area to permit the particulate CaF_2 to settle.

The equipment used to perform the neutralization step ranges from crude manual distribution of the lime with localized agitation to a well-engineered lime control system with a compartmented mixer. Similarly the quiescent areas range from a pond to a controlled settling rake thickener.

Following settlement of the CaF_2 from the partially neutralized (pH 3.5-4.0) water, it will contain 30-60 mg/l (ppm) F and up to 5500 mg/l (ppm) P. This water is again treated with lime sufficient to increase the pH level to 6.0 or above. At this pH level, calcium compounds, primarily dicalcium phosphate plus additional quantities of CaF_2 , precipitate from solution.

This mixture is retained in a quiescent area to allow the CaHPO_4 and minor amounts of CaF_2 to settle.

After settlement, the clear neutralized water will contain 15-30 mg/l (ppm) P at a pH of 6-8. The reduction of the P value is dependent upon the final pH level and quality of the neutralization facilities. Neutralization to pH levels of 9-11 will reduce P value further but this degree of neutralization

exceeds the permissible pH discharge guideline.

The contaminated (gypsum pond) water storage areas are surrounded by dikes. The base of these dikes is normally natural soil from the immediate surroundings. As the need develops to increase the height of the retaining dike, gypsum is dug from inside the diked area and added to the top of the earthen base. Dikes in Florida now rise to 100-120 feet vertical height. These combined earth/gypsum dikes have continual seepage of contaminated water through them. To prevent this seepage from reaching natural drainage streams, it is necessary to collect and reimpound it.

Seepage collection and reimpoundment are best accomplished by constructing a seepage collection ditch around the perimeter of the diked area. The seepage collection ditch must be of sufficient depth and size not only to collect contaminated water seepage but to permit collection of seepage surface water from the immediate outer perimeter of the seepage ditch. This is best accomplished by erection of a small secondary dike. The secondary dike also serves as a back-up or reserve dike in the event of a failure of a major dike.

An installation of a pump station at the low or collection point of the seepage ditch completes this seepage control system. The pumps send the collected seepage water back into the contaminated water storage area. Normally these pumps are operated only a few hours per day, but this is dependent upon the seepage and rainfall conditions.

Superphosphoric Acid

Additional high efficiency control systems would not significantly diminish the fluorine emissions.

Additional water controls are not needed for superphosphoric acid.

Triple Superphosphate

No additional high efficiency control system is proposed other than treatment with three stages of scrubbing.

Additional water controls are not needed for triple superphosphate manufacture.

Ammonium Phosphates

The ammonia content of streams can be considerably reduced by scrubbing with strong acid but with the penalty of increased loading of fluorides. This mode of operation is feasible if provisions are made for tailgas scrubbing with an alkaline scrubbing medium. This will permit better control of the fluorides without undue loss of ammonia.

The best means of reducing $\text{NH}_3\text{-N}$ from appearing in the contaminated water is to prevent its entry into the water. $\text{NH}_3\text{-N}$ enters the contaminated water principally through the ammonium phosphate plant gas scrubber system. A secondary entry point is by way of washdown or water spillage into a surface drainage system. Both of these process streams can be contained and the collected $\text{NH}_3\text{-N}$ containing water can be reintroduced back into the process.

This is accomplished by adjusting the inprocess water balance to permit the absorption of these collected $\text{NH}_3\text{-N}$ containing waters. The degree of water balance adjustment is dependent upon the quantity of water in the two identified streams. Reduction of these water streams to a minimum may require design changes to maximize scrubber water recirculation.

The principal means of adjusting the ammonium phosphate process water balance is to increase the concentration of the phosphoric feed acid used in the plant. Normally 30-40 percent P_2O_5 phosphoric acid is required to produce ammonium phosphates. It may be necessary to increase this concentration to as high as 54 percent P_2O_5 . This is dependent upon the water quantity to be absorbed and the acid concentration required to produce the specific ammonium phosphate product.

F. Relationship of Considered Action to National Forest Land Use Plans, Policies, and Controls

1. Osceola Nation Forest Plans

The Osceola National Forest is one of three National Forests in the State of Florida managed by the Forest Service, USDA, under the principle of Multiple Use and Sustained Yield. There are 161,814 acres within the proclamation boundary of the the Osceola National Forest, of which 157,213 acres are in public ownership. Forest resources are wildlife, recreation, forage, timber, water and minerals.

Establishment and management of the Osceola National Forest are based upon the following non-exclusive list of acts:

- The Organic Administration Act of 1897 which provided for protection, management and use of the forest reserves.
- The Weeks Law of 1911 which authorized the purchase of land for timber production and regulation of the flow of navigable streams.
- The Multiple Use-Sustained Yield Act of 1960 which confirmed long-standing Forest Service policy to administer the National Forests for outdoor recreation, range, timber, watershed, wildlife and fish purposes. It stressed that consideration be given relative values of resources in particular areas.
- The Creative Act of 1891 established the Forest Service jurisdiction to 40 acres of public domain land on the Osceola National Forest.
- The National Environmental Policy Act of 1969 declared a national policy to encourage productive and enjoyable harmony between man and his environment. It established a Council of Environmental Quality in the Executive Office of the President. It provided for a continuing policy for the Federal government to cooperate with State and local governments and other publics to promote the general welfare and to achieve a balance between population and resource use which will permit high standards of living and wide sharing of life's amenities.
- Other Laws, Executive Orders and Regulations which apply to the National Forest.

Forest Service Objectives for managing all National Forests are:

- Promote and achieve a pattern of natural resource uses that will best meet the needs of people now and in the future.
- Protect and improve the quality of air, water, soil and natural beauty.
- Help protect and improve the quality of the open space environment in urban and community areas.

--Generate forestry opportunities to accelerate rural community growth.

--Encourage the growth and development of forestry-based enterprises that readily respond to consumers' changing needs.

--Seek optimum forest landownership patterns.

--Improve the welfare of underprivileged members of society.

--Encourage the development of forestry throughout the world.

--Expand public understanding of environmental conservation.

--Develop and make available a firm scientific base for the advancement of forestry.

Specific Forest Service objectives 1/ for managing the Osceola National Forest include:

--Insure that National Forest facilities are designed, operated and maintained so as to meet environmental quality standards.

--Protect visitors to insure their enjoyment of the National Forest.

--Emphasize quality in management practices.

--Inform and involve the public in planning and management of the National Forest.

--Improve the quality of life by using National Forest programs and facilities to promote social, economic and cultural conditions.

--Expand public understanding of conservation.

--Evaluate effects of proposed National Forest activities upon the quality of the environment. . .to modify, control, eliminate activities not meeting minimum environmental quality standards. Prepare environmental statements as required by 42 U.S.C. sec. 4332.

--Protect National Forest from wildfire through an effective fire protection program.

--Provide a transportation system to meet the needs for protection, development, utilization and administration of the National Forests.

--Manage all resources and activities on National Forest to minimize impacts on soil and water.

--Manage the Forest environment to provide a broad spectrum of recreation activities and experiences.

--Plan and administer the utilization of natural resources to minimize the impact on the visual resource.

--Develop and maintain a pattern of wildlife and fish habitats that will best meet the needs of the people now and in the future.

--Promote and achieve a pattern of timber resource uses that will best meet the needs of people now and in the future.

--Develop the range resource where it exists on National Forest lands to its reasonably attainable potential, and

manage it for sustained grazing in harmony with other resource uses and activities.

--Be responsive to public and private needs for National Forest lands and resources through their authorized occupancy and use. Allow such uses only on lands suitable for that use, and under conditions which protect the public interest, including the proper consideration of environmental quality and landscape integrity.

--Establish a land ownership pattern that will provide for efficient administration of National Forest resources.

--Manage mineral activities in accordance with the principles of multiple use with maximum concern for wise use and conservation of the resource; minimizing disturbance of the surface and providing for reasonable restoration.

--Protect wet lands.

--Protect aquifer recharge areas from activities that would lower water levels in the aquifer or cause pollution.

2. Suwannee River RC&D Plan

The Suwannee River Resource Conservation and Development Project, covering Columbia, Lafayette, Hamilton, Madison and Suwannee Counties, has been approved for planning purposes. The project plan was completed in February 1973.

To date the project has not been funded for operation.

The plan emphasizes the significances of agriculture, recreation and tourism, forestry, natural, historical and scenic areas, land and water, and soils. It lists minerals as a suitable industrial development but does not discuss phosphate deposits specifically.

Broad Objectives

--Manage natural resources to provide for optimum utilization while maintaining an adequate base for sustained use.

--Protect and improve the quality of environment to afford convenient and satisfying places to live, work, and play.

--Provide opportunities for employment, earning power, and cultural fulfillment comparable with those in cities.

Major Policies of the RC&D Project

--Encourage the development of land use regulations that will protect the best agricultural land against inroads by non-agricultural uses.

--Use existing programs to alleviate flood damages.

--Work with regulatory bodies to limit future development on floodplains.

--Encourage the use of land in accordance with soil capabilities.

--Encourage multiple use of land where feasible.

1/ Objectives and policies for managing the National Forest have been extracted from National Forest Planning guides that were developed through public participation and involvement.

- Encourage expansion of public recreation facilities.
- Promote the protection of areas that have unusual natural, scenic, or historical values.
- Support comprehensive planning based on State, Regional, and local participation.
- Promote the use of soils and other resource information in planning at all levels.
- Support meaningful pollution abatement practices and programs.
- Assist in developing programs to protect the quality of surface or ground water supplies.
- Discourage any development which would seriously affect the quality of the environment.
- Promote viable beautification efforts.
- Encourage programs which would help retain the peaceful, natural qualities of the project's woods and streams.
- Work cooperatively with all agencies having interest in resource protection and development.

--Develop a continuing program of communications to keep all agencies and groups fully informed concerning the problems, progress, and needs of the project.

--Improve economic conditions within the project.

--Support programs which will better the quality of life within the project.

3. State Multi-County Planning

Rule 22E-1.01, January 19, 1973, of Florida Adm. Code established 10 multi-County planning Districts in the State.

Columbia, Madison, Taylor, Hamilton, Suwannee, Lafayette, Dixie, Gilchrist, Union, Alachua and Bradford Counties comprise State Planning District No. 3.

Baker, Nassau, Duval, Clay, Putnam, St. Johns and Flagler Counties comprise State Planning District No. 4.

Neither of these multi-County planning Districts is operational as of this date.

Currently, the North Central Florida Regional Planning council headquarters in Gainesville, with primary concern for Alachua County, is the planning agency for State District No. 3. and the Jacksonville Area Planning Board, with primary concern for Duval County, is the planning agency for State District No. 4.

II. DESCRIPTION OF THE ENVIRONMENT

A. Non-Living Components

1. Geology

The phosphate area under consideration is within the Atlantic Coastal Plain physiographic province, bounded on the west by the Piedmont and on the east by the Atlantic Ocean. Economic deposits of phosphate occur within the Coastal Plain from North Carolina to Central Florida (Cathcart, Figure No. 9).

The North Florida-South Georgia phosphate deposits are found in the Hawthorn Formation of Miocene Age, and in other strata of Miocene and Pleistocene Age.

a. Structural Geology

The dominant structural features of the sedimentary rocks in North Florida and South Georgia are the broad and gently dipping anticlines, synclines, and faults.

Figure No. 10 describes the geologic structures in the vicinity of the North Florida-South Georgia phosphate deposits.

b. Surface Geology

The Osceola National Forest is within the Northern Highlands Physiographic Zone, which, in turn, is part of Florida's Coastal Plain (Puri and Vernon, 1964). The Northern Highlands extend from eastern Baker County westward into Alabama and northward into Georgia.

Figure No. 11 shows surface geology in North Florida, including the Osceola National Forest.

The following description of the surface geology is taken from Meyer (1962). The Northern Highlands in the vicinity of the Osceola National Forest are composed of sand and clay which were terraced by seas of Early Pleistocene age. These terraces occur at different elevations. The Okefenokee Terrace is 150 feet above sea level, the Coharie Terrace at 170 feet, and the Sunderland at 215 feet.

Remnants of the Coharie and Sunderland Terraces form a high ridge that crosses the southern part of the Forest from east to west. The surface of the ridge is sandy and almost level, commonly referred to as "flatwoods." Solution depressions and sinkhole lakes occur on this ridge.

North of the east-west ridge, the Okefenokee Terrace slopes gently northward from about 150 feet above sea level along the ridge to about 90 feet above sea level along the Georgia-Florida lines. The surficial sand of the terrace is slightly calcareous, fine-grained, and argillaceous.

Recent (Holocene) deposits consisting of sand, clay, and gravel usually occur beneath the floodplains of rivers and streams in the topographic lows. Fine, windblown sand usually mantles the high areas. Deposits of peat and muck are being formed in the bottom of plugged sinkholes, lakes, swamps, and other poorly drained areas.

c. Subsurface Geology

Underlying the Osceola National Forest are more than 2,000 feet of Cenozoic sedimentary rocks. These rocks, which include the phosphate-bearing strata and the freshwater aquifers, consist of a thick sequence of carbonates overlain by a much thinner section of clastics. Figure No. 12 describes the stratigraphy in the vicinity of the Osceola National Forest.

Quaternary (Pleistocene and Recent) deposits were discussed in the section on Surface Geology. Figure No. 13 is a cross-section across the Osceola National Forest illustrating stratigraphic relationships in the middle and upper Tertiary as well as the Quaternary. Also shown are the base of the phosphate matrix, the top of the Floridan Aquifer and the potentiometric surface of the Floridan Aquifer.

2. Mineral Resources

a. Phosphate

The government-owned phosphate deposits are in the western half of the Osceola Forest. The area involved is low-lying flat land, 80-150 feet above sea level.

Overburden is the layer of material which must be removed to expose the minable layers of phosphate. The minable layers of phosphate are called matrix.

(1) Overburden

The contact between the overburden and the matrix is determined by the economic considerations and rarely coincides with geologic boundaries. In some places, the lower portions of the overburden contain phosphate in quantities that are not economically recoverable.

The overburden is thinnest in the northwest corner of the National Forest, where it is mostly 20' thick. To the south and southeast, the overburden thickens to its maximum of 40' - 60'.

It is primarily composed of unconsolidated sediments ranging in age from middle Miocene (Hawthorn Formation) to Recent (surficial sands) and soil.

Figure No. 14 depicts the overburden. The overburden consists of soil, subsoil, and unconsolidated material. The soils and subsoils are described on page II-11.

In some areas the subsoil contains a sandy-iron-aluminum-organic horizon, sometimes within 2 feet of the surface. This horizon varies from inches to a few feet in thickness. It may be merely a stain, or it may be friable to firmly cemented.

As indicated by Figure No. 14 the remainder of the overburden is a complex sequence of interlying sands and clays. Sand is the dominant constituent with clay becoming more abundant with depth. Carbonate minerals are rare, except in uneconomic phosphate-bearing strata grouped with the overburden.

(2) Matrix

Prospect drilling from 1965 to 1970 on National Forest lands and adjoining private lands west and north of the National Forest boundary resulted in the discovery of several hundred million tons of matrix. The major portion of this was found on privately owned land in Hamilton and Columbia counties. Exploratory drilling on government land indicates approximately 100 million tons of proven reserves with an average matrix thickness of 8-10 feet, and an overburden of 25-30 feet. The phosphate found in the western part of the Forest has an average grade of 68 percent BPL (31.2 percent P_2O_5). It is estimated that an additional 20 million tons of reserves which could be economically mined at some future date are present on National Forest lands. These phosphates are sedimentary phosphorites and

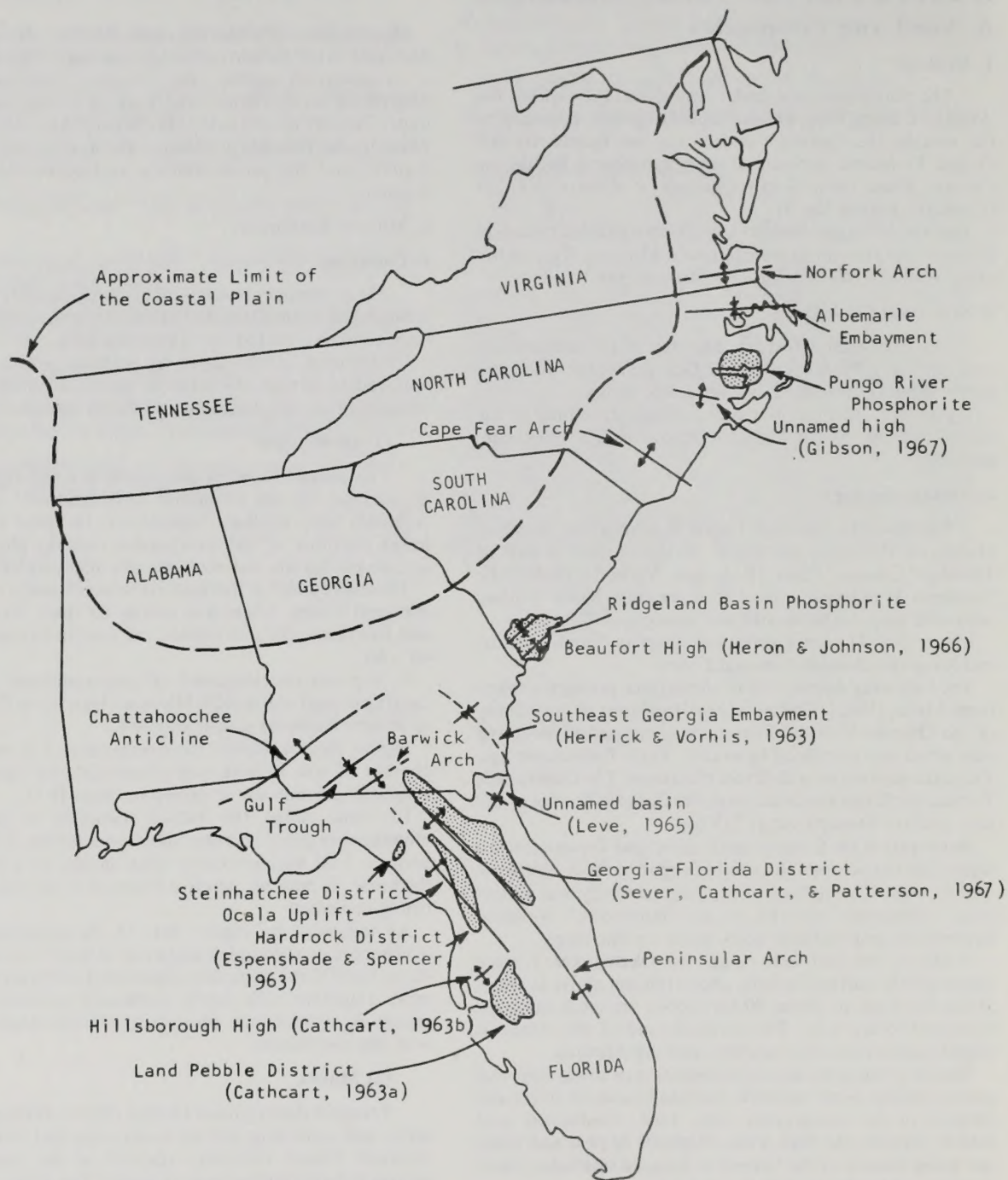
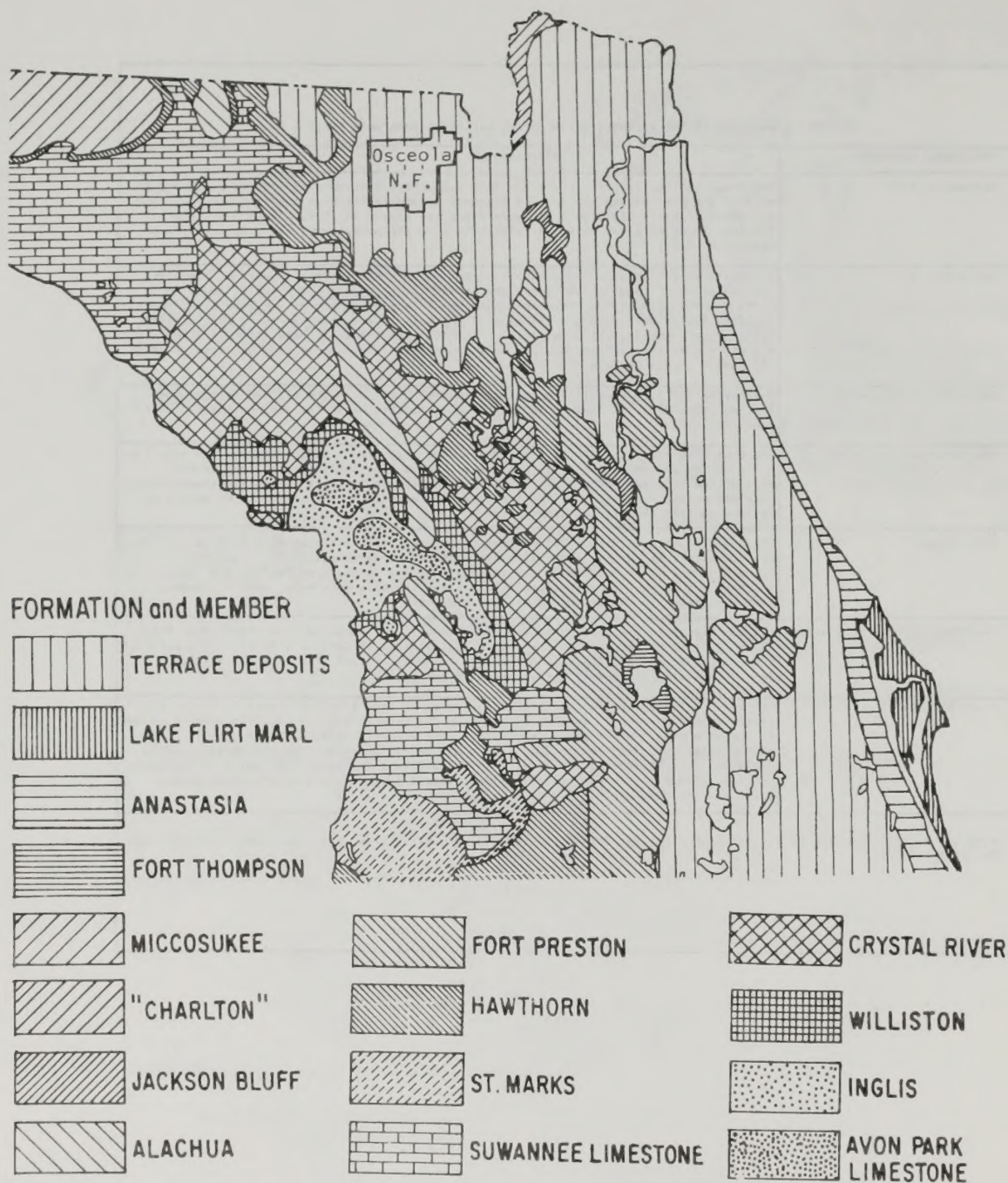


FIGURE II-1 MAP OF THE EASTERN UNITED STATES SHOWING STRUCTURES OF THE COASTAL PLAIN AND PHOSPHORITE DEPOSITS OF TERTIARY AGE

GEOLOGIC STRUCTURES IN THE VICINITY OF THE GEORGIA-FLORIDA PHOSPHATE FIELD	
STRUCTURAL FEATURES	DESCRIPTION
Peninsular Arch	The broad Peninsular Arch is the dominant subsurface structure in Florida and forms the axis of the Florida peninsula. The Arch was a topographic high during Cretaceous time; sediments of early Cretaceous age were deposited around it (Puri and Vernon, 1964). The Peninsular Arch has no known relationship to the phosphate (Sever, Cathcart, and Patterson, 1967).
Ocala Uplift	The Ocala Uplift is a broad, northwest trending dome whose crest is west of the older Peninsular Arch. The two antiforms are apparently unrelated. The uplift began in early Miocene time and may have continued until late Miocene time. A zone of northwest-trending faults extends along the axis of the Uplift, and the flanks and ends of the structure are modified by minor folds. The most prominent of these folds is a low anticline that splits from the main axis and extends through the Live Oak area, Florida, and possibly into Georgia.
Apalachicola Embayment	The Apalachicola Embayment is a southwest-plunging basin in the eastern part of the Florida panhandle. It lies south of the Chattahoochee Anticline and northwest of the Ocala Uplift.
Chattahoochee Anticline	The Chattahoochee Anticline is a broad low dome that trends northeasterly from near the point on the Chattahoochee River where the Georgia-Florida-Alabama boundaries meet. West of the tri-state point, the axis of the anticline flexes to a west-southwest trend. Some geologists, however, believe that the axis extends in a north-south direction and is located near the Chattahoochee River.
Gulf Trough	The Gulf Trough is a structural depression between the Chattahoochee Anticline and the Barwick Arch. It is only about 10 miles wide at its narrowest point in southern Georgia, where it is bounded on the southeast by the Ochlockonee Fault. The trough broadens and plunges southwestward into the Apalachicola Embayment, and it broadens northeastward into the Southeast Georgia Embayment.
Southeast Georgia Embayment	The Southeast Georgia Embayment is a broad depositional embayment in the Coastal Plain of Georgia and extends across the entire coastal area of Georgia into adjoining parts of Florida and South Carolina. It originated in middle Eocene time and continued as a depositional basin intermittently through Miocene time.
Other Structures	Lesser structures occur on the flanks and noses of the large anticlines or are widely separated and apparently unrelated to them. The Barwick Arch in southern Georgia is one of the more prominent of these structures. The axis of the arch trends northeasterly, approximately parallel to the Gulf Trough and nearly perpendicular to the axis of the Ocala Uplift. Another structure is a northeasterly trending unnamed basin in northeast Florida. The axis of this basin is aligned generally with the axis of the Ridgeland Basin and the Beaufort High in South Carolina.
With the exception of the Peninsular Arch, the descriptions of the geologic structures were from Sever, Cathcart, and Patterson (1967).	



(after PURI and VERNON, 1964)

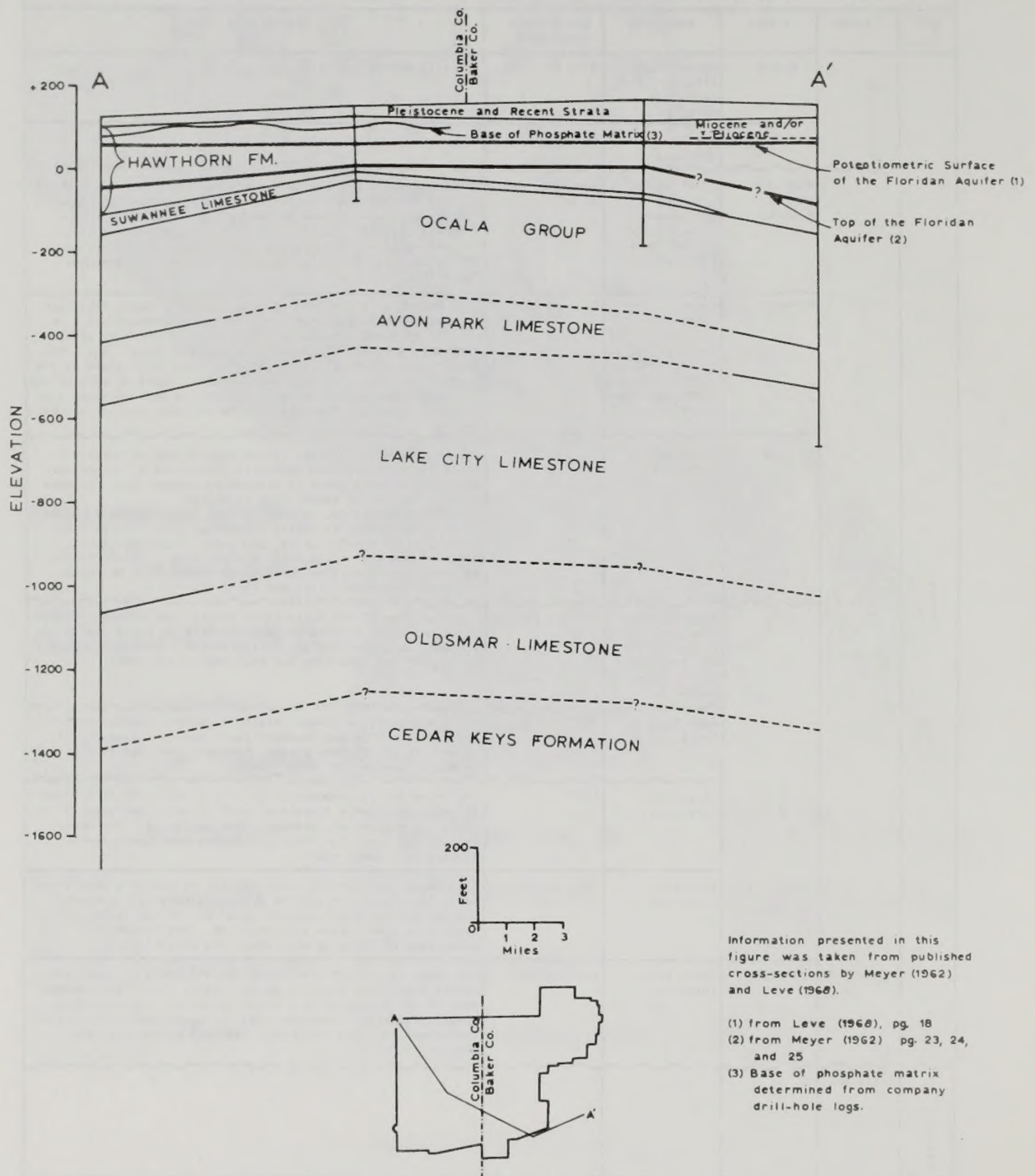
Geologic map of Florida.

DESCRIPTION OF STRATIGRAPHIC SECTION IN THE VICINITY OF THE OSCEOLA NATIONAL FOREST					
ERA	SYSTEM	SERIES	FORMATION	APPROXIMATE THICKNESS	DESCRIPTION
Cenozoic	Quaternary	Recent	Unnamed lake, alluvial, and windblown material	0 to 10' - 20'	Refer to discussion of Surface Geology
		Pleistocene	Marine terraces	Variable, max. of 40'	Refer to discussion of Surface Geology
	Tertiary	Pliocene and/or Miocene	Pliocene and/or Miocene sediments undifferentiated ? Alachua Fm.	Variable, max. of 45'	These sediments are similar to the Hawthorn, but their exact age and stratigraphic relationships are incompletely known. For the most part, these sediments are nonmarine or transitional clastics locally containing abundant phosphate. In Baker County, these strata contain less phosphate, more shells, and are probably equivalent to the Choctawatchee Formation.
		Miocene	Hawthorn Formation (include strata referred to by Meyer, 1962, as "Miocene Sandstone and Limestone")	100' to 250'	The Hawthorn is composed of gray to green, sandy clay with interbedded hard phosphate or dolomitic limestone and fine to coarse phosphorite sands. The color of the clay varies from dark green to black to light green to gray. The large, water-worn, phosphorite pebbles that occur within and at the base of the formation indicate diastems. Beds of clay of the upper part appear to be equivalent to beds of sandy clay of the Alachua (?) Formation in the southern part of Columbia County.
		Oligocene	Suwannee Limestone	0 to 40'	The limestone is thickest in the western and northwestern parts of the Forest and generally thins toward the southern and eastern parts where it eventually pinches out. In some places, the top is dense, gray to white, fragmental limestone; in other places, it is a dense, brown to gray, dolomitic or cherty limestone; and in still other places, it is a soft, white, and pasty limestone that contains seams of olive drab to black clay. The formation contains solution pipes, many of which are fine to coarse quartz or phosphatic sand and light green clay.
		Eocene	Ocala Group (includes Crystal River, Williston, and Inglis Formations)*	200' to 275'	The limestone of the Ocala Group varies from a porous, cream to white, loose coquina of large foraminifers and shells to a brown, solution-riddled, echinoid-rich limestone. Locally the top of the limestone has been replaced by chert.
			Avon Park Limestone	90' to 160'	The formation is a creamy, chalky limestone that generally has a distinctive and abundant fauna consisting mostly of Foraminifera. In some places, however, the limestone is nonfossiliferous and dolomitized.
			Lake City Limestone	500'	The formation is composed of alternate layers of dark brown dolomite and chalky limestone, both of which may contain chert and gypsum and, perhaps, some anhydrite. The upper part of the formation locally contains some carbonaceous material and green clay.
			Oldsmar Limestone	300' to 350'	The Oldsmar is lithologically similar to both the underlying Cedar Keys Formation and the overlying Lake City Limestone. The top half of the formation is a very porous, brown limestone with some gypsum and anhydrite. The bottom half is a thick zone of dolomite with chert and anhydrite.
		Paleocene	Cedar Keys Formation	400' to 450'	The lower section of the formation is dolomitic. Near the middle there is a distinct marker bed of clay. The greater part of the formation is a dense to porous, gray to white to brown, fragmental limestone that is impregnated with gypsum and anhydrite. Red calcareous clay and pyrite are also present.
	Cretaceous				
Mesozoic					

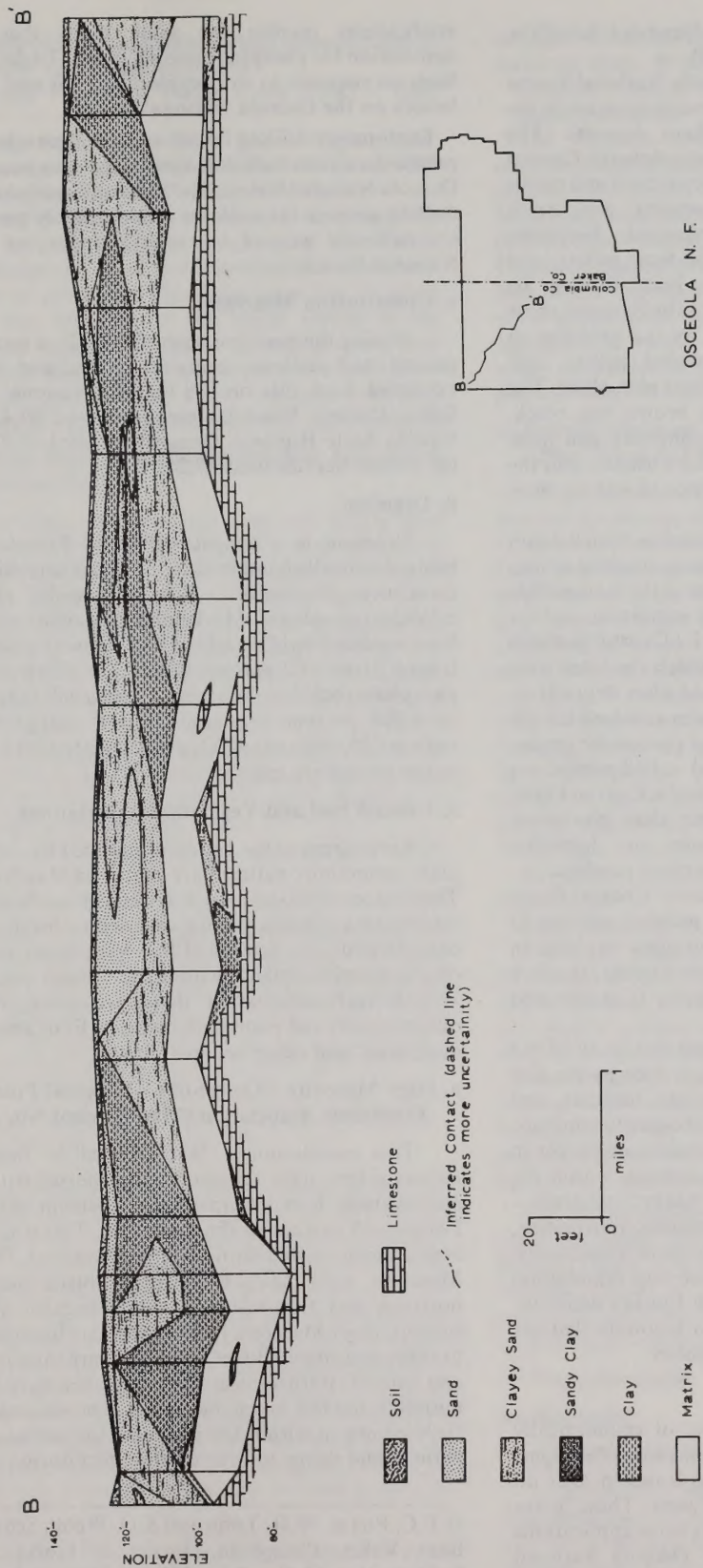
Data presented in this chart were obtained from Meyer (1962); Clark, Musgrove, Menke, and Cagle (1964); and Leve (1968).

*These formations conform to the nomenclature used by the Florida Geological Survey and are not recognized by the U.S. Geological Survey.

Figure II-4



SUBSURFACE GEOLOGY



OVERBURDEN AND MATRIX

are a carbonate fluorapatite having the formula $Ca_{10}(PO_4CO_3)6F_{2-3}$ (Altschuler and others, 1958).

The phosphate deposits in the Osceola National Forest are of the land pebble type, similar in many respects to the Central Florida land pebble phosphate deposits. The phosphate pellets in all the deposits on the Atlantic Coastal Plain are very similar. They include internal casts and molds of fossils, phosphatized bone fragments and teeth (particularly shark's teeth), phosphatized limestone fragments, elongate grains that may be fecal pellets, and rounded, zoned particles that have been formed by precipitation around a nucleus. Many of the particles show evidence of reworking - as indicated by the presence of compound pellets, broken and rerounded pellets, and phosphatized fossils that have a rim of later phosphate. The phosphate particles are white, gray, tan, brown, red, black, and green. All are rounded, some are spherical, and most have a high luster. Particles that are dull are usually near the surface of the deposit and show evidence of having been altered by solution. (Cathcart 1967)

The phosphate pellets range in size from less than 0.1 mm to several centimeters, and are sometimes as massive as tens of centimeters in diameter. In the deposits of the land-pebble district of Florida, the particle size is very important, and the variation in particle size can be mapped. 1. Coarser particles are found on submarine ridges, from which the fines were winnowed by current action, during and after deposition. Screening is necessary to obtain a uniform size feed for the flotation plant that separates quartz and phosphate grains. In the land pebble district, 1mm material, called pebble, is a phosphate product. Elsewhere in the Atlantic Coastal Plain, the coarser sizes contain material other than phosphate (quartz shell material, and limestone or dolomitic fragments) therefore, coarse material is not a product.

In the phosphate deposits of the Atlantic Coastal Plain, the matrix consists of sand, clay and pebbles, varying in relative amounts and compositions from place to place. In the phosphorite of South Georgia-North Florida, the clay minerals are predominantly montmorillonite. (Cathcart and Young, 1964)

Iron minerals are present in small amounts in all of the phosphorite deposits. The iron minerals include pyrite, and the iron oxide minerals - hematite, goethite, limonite, and the weathered zones in Florida, the iron phosphate minerals, vivianite and dufronite. Glauconite, a trace constituent in many of the deposits, is found almost entirely within the phosphate pellets. Trace amounts of "heavy" minerals - ilmenite, zircon, rutile, staurolite, sillimanite, tourmaline, and several others - are present in most or all of the deposits. Aluminum phosphate minerals (wavellite and erandallite) are important secondary minerals in the Florida deposits.

Uranium minerals are also present in amounts that are large enough to cause radioactive anomalies.

b. Oil and Gas

In addition to the known deposits of economically recoverable phosphate, there is a potential for oil and gas. The United States issued 24 oil and gas leases in 1971 on 54,662 acres in the Osceola National Forest. These leases remain in effect. In addition, oil and gas lease applications are pending on the remainder of the Osceola National Forest. Some of the existing leases and pending lease

applications involve the same lands that are under application for phosphate mining leases. To date, there have been no requests to drill exploratory oil and gas wells by lessees on the Osceola National Forest.

Exploratory drilling for oil and gas is now being done on private lands one-half mile west of the west boundary of the Osceola National Forest. The State of Florida has issued five drilling permits for wells on a line roughly parallel to, and one-half mile west of, the west boundary of the Osceola National Forest.

c. Construction Minerals

During the past five years (1968-72), a total of 192,626 tons of road material, consisting of sand and clay, has been extracted from pits on the Osceola National Forest. The Baker County Road Commission used 99,430 tons; the Florida State Highway Department used 45,954 tons; and the Forest Service used 47,242 tons.

d. Uranium

Uranium is a constituent of all Florida phosphate, being chemically combined in the phosphate minerals. It is a constituent throughout, from pebble-size phosphate to colloidal phosphates. Marketable phosphate rock produced from central Florida washing and recovery plants will assay from 0.01 to 0.02 percent U_3O_8 . The assay of marketable phosphate rock from northern Florida will range from 0.006 to 0.007 percent uranium (U_3O_8). Daughter products, radium 226, and radon 222, are associated with the uranium in the phosphate matrix.

3. General Soil and Vegetation Associations

Large areas of the Forest dominated by similar soil and plant community patterns are shown on Map No. 3, Sec. XI. This is a generalized map and description but the detailed information is available and was used to develop the general data. In addition, Section II B 1, Vegetation, contains a list of characteristic plants within each broad vegetative type. Within each association there are some inclusions of different soils and plant communities. Four associations are designated and described as follows:

a. High Mascotte - Leon Soils - Longleaf Pine Flatwoods Association (Map Symbol No. 1)

This association is characterized by nearly level to convex ridges in the flatwoods, interspersed with a few bays and swamps. It makes up about 20 percent of the National Forest or 5 percent of the lease area. This is the driest and best-drained association on the National Forest. High Mascotte soils have thin gray-to-black sandy surface horizons and firm-to-brittle sandy organic layers in the subsoil. High Mascotte has a sandy clay loam layer at three to three and one-half feet. Leon soils are sand in the surface and subsoil. Both soils are strongly acid, very low in plant nutrients and low in organic matter. The seasonal high water table comes to within ten inches of the surface during wet periods and drops to four or more feet during dry periods.

1/ E.C. Pirkle, W.H. Yoho and S.D. Webb, Sediments of the Bone Valley Phosphate District of Florida, Economic Geology Vol. 62 No. 2 pp. 237-261 (March-April 1967).

About 60 percent of this association is High Mascotte and 25 percent Leon and 15 percent inclusions.

High Mascotte - Coastal Plains Code 91683 - Ultic Haplaquods

Leon - Coastal Plains Code 90673 - Aerlic Haplaquods

Major Inclusions - Coastal Plains Code 81390 and 81200 (See attached explanation for Coastal Plain Codes).

The Longleaf Pine Flatwoods overstory is dominated by longleaf pine with scattered slash pine being common in places. The average site index 1/ for longleaf and slash pines on these soils is about 70. This represents fair to good productivity. Saw Palmetto is the major species in the understory. This species is slightly chlorotic, dense and about two feet in height in this association. Runner oak is abundant in the ground cover. Other vegetation includes gallberry, wiregrass, panic grasses, blueberry and bluestem.

b. Low Mascotte Soil - Slash Pine Flatwoods Association (Map 3 Symbol No. 2)

This association is characterized by low nearly level flatwood interspersed with many small bays and swamps. It makes up about 50 percent of the National Forest or 55 percent of the lease area. Low Mascotte soil has a moderately thick black sandy surface horizon and a sandy clay loam layer in the subsoil beginning at about three and one-half to four feet. This soil also has a thin friable organic layer beginning at about two feet. Low Mascotte soil is very strongly acid, low in plant nutrients and low to medium in organic matter. This seasonal high water table is on the surface and drops to about three feet during dry periods. About 25 percent of this association consists of wetter or drier soils than Low Mascotte.

Low Mascotte - Coastal Plains Code 40180 - Ultic Haplaquod

Major Inclusions - Coastal Plains Code 30105 and 91690

The slash pine flatwoods overstory is dominated by slash pine with scattered longleaf pine common in places. This soil is highly productive of slash pine and the site index is about 80. Gallberry is abundant, tall and vigorous. Saw palmetto is common and fairly vigorous. Wax myrtle occurs in places. The most common ground vegetation consists of panic grass, wiregrass, blueberry and beak rush.

c. Pamlico Soil - Cypress-Blackgum Swamp Association (Map 3 Symbol No. 3)

This association is characterized by concave, wet and ponded landforms with dense swampy vegetation. It makes up about 18 percent of the National Forest or 30 percent of the lease area. Pamlico soils have a mucky surface layer one to four feet thick, overlying gray sand. Some sand is mixed in the surface layer. In some places a sandy clay loam layer occurs at about three and one-half to four feet. The soil is waterlogged, extremely acid, medium in plant nutrients and high in organic matter. These are the wettest soils on the Forest but the most productive in terms of total biomass and wildlife foods produced. The water table is generally near or on the surface but drops to a foot or more below the surface during dry periods. The central part of some swamps has low

enough elevations to be permanently ponded. Inclusions make up about 30 percent of these areas.

Pamlico - Coastal Plains Code 00025 - Terric Medisaprist Major Inclusions - Coastal Plains Codes 00085 and 30001

The Cypress-Blackgum plant community overstory consists predominately of cypress and blackgum but some areas are dominated by sweet bay, loblolly bay, similax and fetterbush with scattered pond pine. Some of the better drained areas within the bays are dominated by slash pine. Degree of wetness determines the vegetative types. Common understory vegetation consists of similax, Virginia willow, sweet pepperbush, buttonbush and large gallberry. Ground vegetation is rather scarce because of the usual flooded condition but in the less wet areas ferns, sundew, club moss, pickerel weed, rushes and sedges are common.

d. Rutlege-Plummer Soils - Creek Swamp Association (Map 3 Symbol No. 4)

This association is characterized by flat to slightly concave landforms adjacent to streams. It makes up about 12 percent of the National Forest or about 10 percent of the lease area. Rutlege soils have a thick black sandy surface layer and a gray sandy subsoil. Plummer soils have a black to gray sandy surface layer and a sandy clay loam subsoil beginning at about three and one-half feet. Both soils are strongly acid, medium in organic matter and low in plant nutrients. The seasonal high water table is on the surface. Overflow from streams and surrounding bays contributes to flooding during wet seasons. The water table drops to two or three feet during dry periods. Rutlege, Plummer and inclusions make up about 40 percent, 40 percent and 20 percent respectively of the unit.

Rutlege - Coastal Plains Code 11105 - Typic Humaquepts

Plummer - Coastal Plains Code 41190 - Grossarenic Paleaquults

Major Inclusions - Coastal Plains Codes 00085 and 31001

The Creek Swamp Plant community consists of a variety of overstory vegetation with red maple, black gum, sweet bay, slash pine, sweet gum and cypress dominating. These are highly productive areas for hardwood timber and wildlife foods. Understory vegetation consists of a wide variety of shrubs. Those dominating include alder, Virginia willow, sweet pepper bush, buttonbush, greenbriar, and small gum and bay trees. Ground vegetation includes marsh pennywort, smartweed, arrowhead, sedges, cane, sun dew, hypericum, muscadine, violets and ferns.

Further definitions of these categories can be obtained from the Forest Service Supervisor's Office in Tallahassee, Florida. Each soil type is given a five digit code. For example, 12181 is a soil on floodplains that is loamy-textured, has a wet water regime, has a sand cap 20 to 40 inches thick, and is extremely acid.

4. Water Resources

a. Watershed

Basin Hierarchy

The Osceola National Forest is contained within the Suwannee and St. Marys River Basins (see Figures 15 and 16). These two sub-basins form a portion of the larger South Atlantic Gulf Basin. The Osceola National Forest has been

1/ Site index is the height to which a tree is expected to grow during the first fifty years of life.

divided into watersheds (see Section XI Watershed Map No. 4) identified below by basin and watershed acreage:

- 03 - South Atlantic Gulf Basin
 - 22 - Suwannee River Basin
 - 0322000005 - Deep Creek (47,600 acres)
 - 0322000006 - Robinson Creek (9,000 acres)
 - 0322000007 - Falling Creek (14,000 acres)
 - 22 - Suwannee River Basin
 - 03 - Santa Fe Drainage
 - 0322030008 - Olustee Creek (3,000 acres)
 - 14 - St. Marys River Basin
 - 0314000003 - Middle Prong (80,600 acres)
 - 0314000004 - Cedar Creek (3,000 acres)

The Cedar Creek and Olustee Creek watersheds do not lie within the permit area.

Two major drainages are affected by the various streams which originate and flow from the Osceola National Forest. The Suwannee River, which originates in the Okefenokee Swamp north of the National Forest, flows fairly close to the western boundary of the National Forest. Three forest streams tributary to the Suwannee River are: Deep Creek, Robinson Branch, and Falling Creek. The Suwannee River has been recommended for inclusion to the National Wild and Scenic Rivers System by the Secretary of the Interior.

The St. Marys River also originates in the Okefenokee Swamp north of the Forest and flows easterly on the north-east side of the Forest. The major Forest stream which significantly affects the St. Marys River is Middle Prong of the St. Marys River.

Topography and Drainage

The Osceola National Forest is within the Northern Highlands Physiographic Zone as described by Puri and Vernon (1964). The Northern Highlands in the vicinity of the Osceola National Forest generally comprises those areas which are more than 100 feet above mean sea level, and are composed of a series of ancient marine terraces that were formed by seas of Early Pleistocene Age. The Northern Highlands comprise 95 percent of the lease area.

The Coharie and Sunderland Terraces form an east-west trending ridge (see Fig. 17) which acts as a surface-water divide between water flowing to the north and to the south (refer to Surface Geology section for a description of the ridge). North of the ridge, the gently sloping surface extends into Georgia and forms the basin for the present-day Okefenokee Swamp. Surface drainage is either north-westward via Deep Creek, Robinson Branch, and Falling Creek or eastward to the St. Marys River via Middle Prong (Rudy Branch) and Cedar Creek. South of the ridge, the land is flat and poorly-to-well-drained. Several of the streams (Olustee, Clay Hole, and Rose Creek) draining the area south of the ridge disappear into sinkholes. Most of the lease area lies north of the ridge.

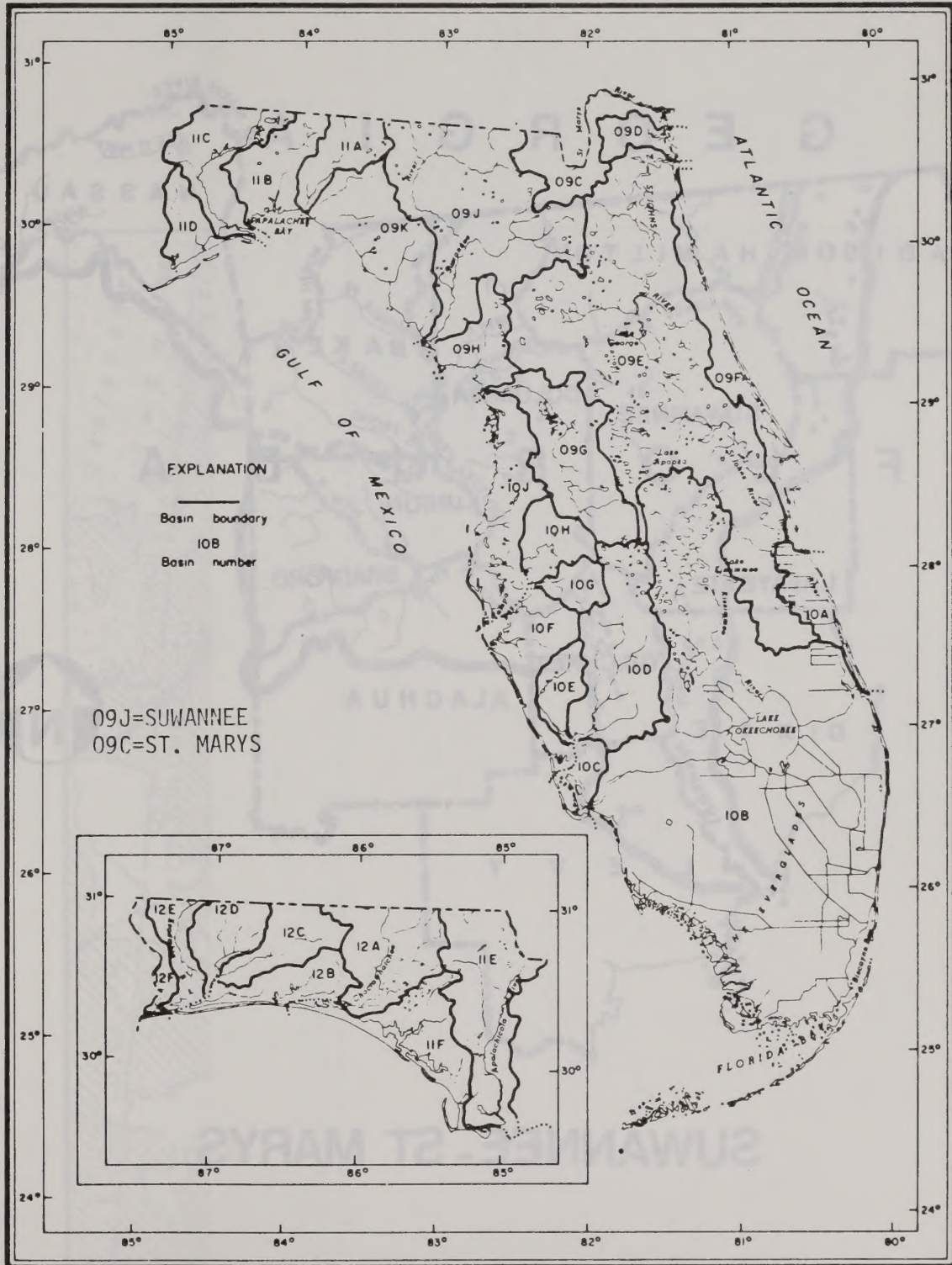
The Suwannee River changes direction from south to west at a point about 6 miles east-northeast of White Springs where its valley crosses and intersects a hard calcareous bed of clay. The river crosses and intersects limestone somewhere between White Springs and a point 6 miles east-northeast of White Springs. Above the point of intersection, the flow in the river depends mostly on run-off of local rainfall. Below the point of intersection, the increased base flow of the river is attributed to large springs in the exposed limestone.

FOREST SERVICE COASTAL PLAIN SOIL CODES

IDENTIFICATION KEY

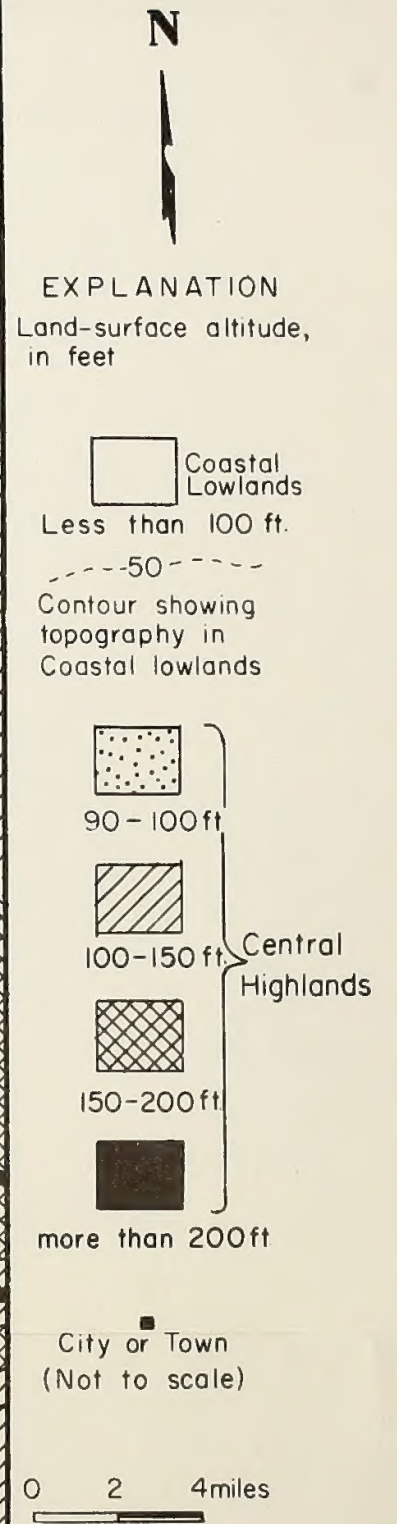
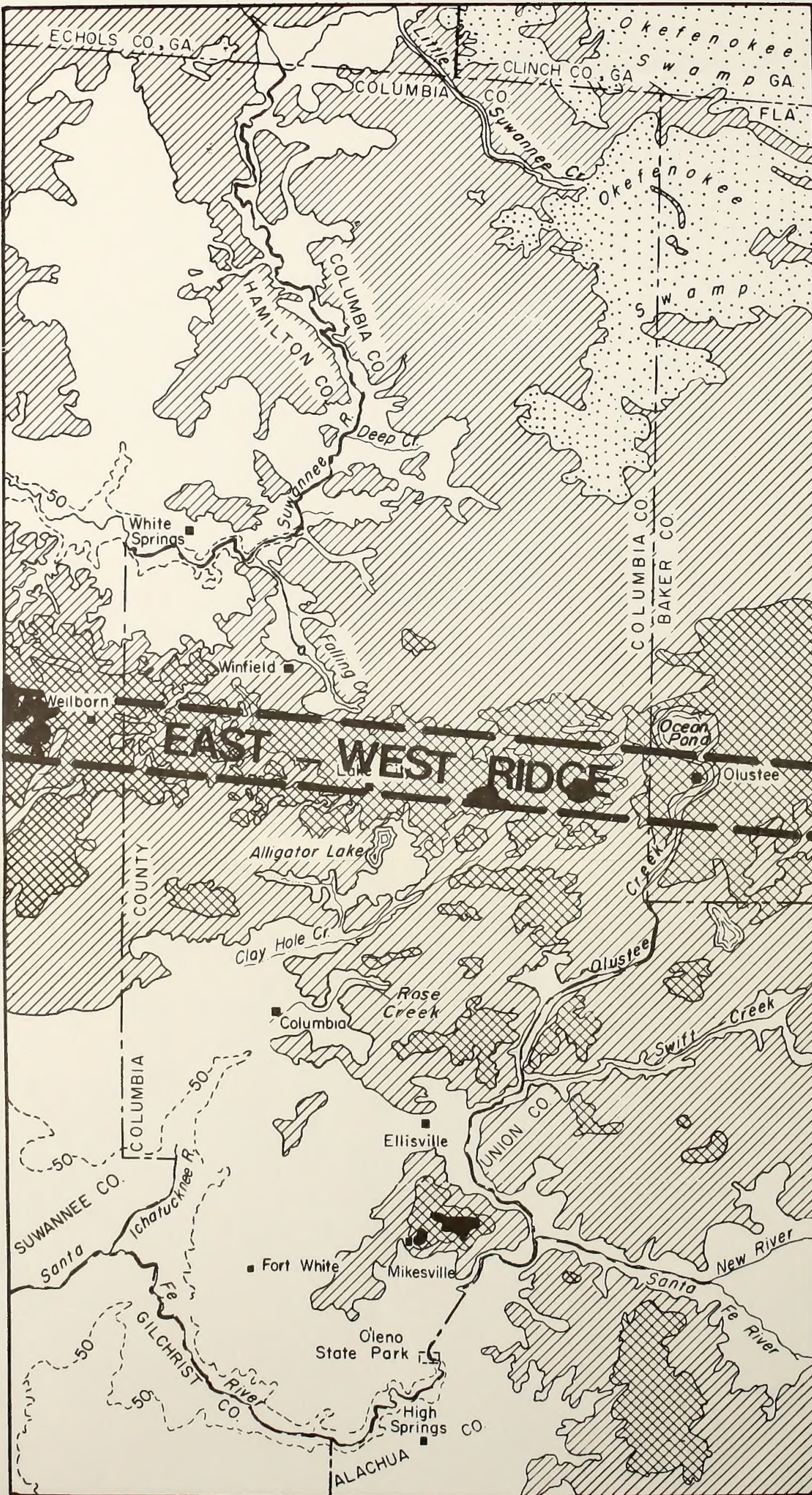
A LANDFORMS	CODE B TEXTURE		CODE C WATER REGIME		CODE
Swamp	0	Coarse	0	Waterlogged	0
Flood Plain	1	Sandy	1	Wet	1
Stream Terrace	2	Loamy	2	Moist	2
Bay	3	Silty	3	Dry	3
Upland Flat	4	Medium	4	Droughty	4
Lower Slope	5	Fine	5	Very Droughty	5
Side Slope	6	Very Fine	6	Dry-Wet	6
Steep Side Slope	7	Organic (20")	7	Wet-Dry	7
Ridge	8	Clay to Surface	8		
Low Ridge	9				
D ACCESSORY CHARACTERISTICS	CODE	E MODIFIERS			CODE
None	0	None			0
Rhodic	1	Extremely Acid			1
Organic (2-4')	2	Extremely Alkaline			2
Organic (4')	3	Shallow Soils (20" to restrictive layer)			3
Pan (fragipan)	4	Sodium			4
Pan (plinthite)	5	Water			5
Organic pan (20" deep)	6	High Shrink-Swell Clays			6
Pan (other)	7	Gravel			7
Sand Cap (20-40" thick)	8				
Sand Cap (40-60" thick)	9				

RIVER BASINS AND COASTAL AREAS





SUWANNEE - ST MARYS



Adapted from Army Map Service
sheets NH 17-4 and NH 17-7

Falling Creek, a tributary of the Suwannee River, is captured by a sinkhole, and is typical of the creeks in the karst topography. A 7- to 9-foot waterfall is formed where the creek flows over a dense, gray, sandy, indurated, phosphatic clay bed which caps a soft, light green, sandy clay. Downstream from the falls, the valley is entrenched about 20 feet into the clay. About a quarter of a mile downstream the valley becomes a maze of incised meanders and terminates at a sinkhole located about 0.7 mile east-northeast of Winfield.

That part of the Okefenokee terrace lying on the south side of the east-west ridge is flat and poorly-to well-drained.

The Okefenokee terrace, south of the east-west ridge, is drained principally by Olustee, Clay Hole, and Rose Creeks, tributaries of the Santa Fe River. Olustee Creek depends largely on surface runoff from the swamps and flatwoods in Columbia, Baker, and Union Counties. However, the flow of Olustee Creek increases or decreases, depending upon ground-water conditions, from its headwaters to the confluence with the Santa Fe River Valley. The valley of Olustee Creek apparently follows the joints or fractures in the underlying limestone. At O'Leno State Park, flow of Olustee Creek and the Santa Fe River is captured by a sinkhole in the limestone. The river disappears underground and emerges through springs 3 miles southwest of the sinkhole.

Clay Hole and Rose Creeks, in the central part of Columbia County, have the same general hydrologic characteristics as the downstream parts of Olustee Creek and the Santa Fe River. These streams either disappear entirely into sinkholes or lose water to the underlying limestone by percolation.

Coastal Lowlands

The Coastal Lowlands is a region of karst topography, which ranges from approximately 25 to 100 feet above mean sea level. It occupies the southwest part of Columbia County and extends up the valleys of Olustee Creek, the Santa Fe River and the Suwannee River. The region is bounded on the north by a terrace escarpment which forms the southern boundary of the Okefenokee terrace. The scarp exposes as much as 50 feet of clastic sediments which contain fossil coral. The Coastal Lowlands comprise about 5 percent of the lease area.

The Coastal Lowlands is underlain by low, rolling, flattened hills of silicified, cavernous limestone. The limestone is overlain and filled by sand and clay.

Swamps

Approximately 30 percent of the National Forest exists in a swampy condition during the wet season and remains quite moist even in "dry" periods due to the relatively high water table. About 40 percent of the permitted area is swampy.

Big Gum Swamp and Impassable Bay are significant among these swampy areas, and comprise a total of approximately 25 square miles. About 30 percent of Big Gum Swamp and 10 percent of Impassable Bay are within the potential lease area.

Other bays and swamps in the permitted area are Cowhouse Bay, Otter Bay, Little Gum Swamp, Buckhead

Swamp and Ocean Bay.

Drainage ditches frequently parallel roads to improve their ability to sustain vehicular traffic.

Lakes and Springs

Ocean Pond, approximately 1750 acres, is the most important source of water-based recreation in the Forest. Ocean Pond is not within the potential lease area.

Three small artificial ponds exist within the permitted area along Interstate 10 as a result of excavating borrow material for the highway. These ponds are shallow (less than 10 feet in depth) and have a small fish population.

Some of these ponds tend to dry up during droughty periods. The lakes are eutrophic as a result of surface drainage and artificial fertilization. Other small, natural ponds are scattered throughout the area but do not occupy a significant portion of the watershed area.

There are no known active springs in the Osceola National Forest. The majority of springs exist along the Suwannee River. Famous White Springs is a few miles northwest of the National Forest.

b. Surface Hydrology

Streamflow - gauged streams

The U.S. Geological Survey has for many years maintained records of stage (stream height, ft.) and discharge (streamflow, cubic feet per sec. or cfs) in both the St. Marys and Suwannee River Basins. The 1969 published station summaries are described in Appendix 1.

Streamflow - ungauged streams

No streamflow records are available for the headwater streams on National Forest land. However, the areas drained by these headwater streams have similar hydrologic characteristics to those gauged U.S.G.S. streams. Thus, assuming a mean annual "uniform rainfall" distribution over the area, the mean annual flows can be simply approximated by using an "equal area projection." Based upon data from 11 U.S.G.S. stations, the mean annual flow per square mile (cfs/m) is 0.862. Multiplying this factor times the appropriate watershed area (square mile), the mean annual flows for the Forest Service watersheds become:

Watershed	Streamflow cfs (at mouth of watershed)
Deep Creek	64.1
Robinson Creek	12.1
Falling Creek	18.9
Olustee Creek	4.0
Middle Prong St. Marys	108.6
Cedar Creek	4.0

Table 1 shows the headwater streams and small tributaries which can be influenced by activities on National Forest land. The average fall per mile illustrates the relatively "flat" gradient of these streams.

Flow Characteristics

Streamflow is extremely variable because of the high water table and ambient weather conditions. Hurricanes and prolonged droughts cause the streams to periodically flood or "dry up." These characteristics are important when planning any activities which will alter the landscape and change the runoff distribution of these streams.

HEADWATER STREAMS IN SUWANNEE - ST. MARYS RIVER BASIN ON FOREST SERVICE LAND

Name of Stream	Length in Miles	Source Elev. Ft. MSL	Mouth Elev. Ft. MSL	Avg. Fall Ft./Mi	Drains Sq. Mi.	Flows Into	Mouth County Location
Calkins Creek	7.0	125	85	5.7		Cedar Ck.	Baker
Camp Branch	11.5	132	115	1.5		Deep Ck.	Columbia
Caney Flat Br.	2.0	130	110	10.0		Deep Ck.	Columbia
Cedar Creek	13.2	15	0	1.4	71.0	St. Marys R.	Baker
Deep Creek	13.6	125	80	3.1		Suwannee R.	Columbia
Falling Creek	13.8	140	60	5.6		Suwannee R.	Columbia
Middle Prong St. Marys River	12.4	150	125	2.0	220.0	St. Marys	Baker
Olustee Creek	26.6	154	40	4.3	170.0	Santa Fe R.	Union
Robinsons Branch	9.4	135	65	7.4		Suwannee R.	Columbia

Subsurface flows lines normally will be toward existing streams. However, at low flows Forest Service personnel have observed that surface runoff occurs in one direction, whereas at high flows or flood stages flows are in opposite directions. Thus, due to the relatively flat nature of the topography the surface flood flows may occur *between* watersheds (interbasin flow transfer).

Low flows are influenced by the subtle supply of water from various swamps and bays. These act as "reservoirs" which, along with ground water discharge to the stream courses, tend to prolong stream flow at lower elevations. Most of the streams in the National Forest are intermittent (tend to "dry up" in the summer) except Deep Creek and the Middle Prong of the St. Marys River which are perennial streams (constantly flowing). Surface vegetation removal will decrease the amount of water lost through evapotranspiration and will extend the low flow period. 1/ Low flow periods normally occur from June through August, or May through November during prolonged droughts.

Floods are almost an annual occurrence. The magnitude are recurrence of floods can be predicted with a fair dependability from established long term stations within the same hydrologic province.

Data from Pride 2/ (figure 18) shows the variation of flood discharge by drainage area for particular flood recurrence intervals from the "mean annual" through the 50 year flood.

This indicates, for example, that Deep Creek could expect annual floods of 1600 cfs and up 5600 cfs for the 50-year flood event. The soils are usually near saturation at flood periods, i.e., water tables are high and the soil moisture has steadily increased due to a few days of rain before the main storm cell enters the area. This means little or no additional water can be stored and thus the rainfall immediately runs off as stream flow (floodflow).

Floodflows can occur at any time of the year as a result of normal "wet" periods, hurricanes, or massive storm fronts (tornadoes, convectional storms, etc.). Flood flows usually occur annually from September through April.

Flood prone maps (preliminary maps No. 5.1 to 5-12) have been prepared by the U.S.G.S. and indicate a significant amount of land surface that will be inundated by a 100-year flood event. 3/ These maps indicate that floods must be considered in management planning of the private lands and the Osceola Forest especially near live streams and low-lying swamps.

Lake Evaporation

Stage data (fluctuation of water surface) for Alligator Lake near Lake City is illustrated in the Appendix No. 2. No stage data is available for Ocean Pond.

Estimates of lake evaporation have been made by PRICE (op. cit.).

He estimates that the net annual surface water loss could be as much as 8.12 inches.

c. Water Quality and Water Usage

Water Quality

Streams and lakes on the Osceola National Forest and vicinity are classified as Class III waters (see Appendix No. 3 -Florida Water Quality Rules).

Background water quality measurements have been established for the major streams on the Osceola National Forest. The Forest Service has been measuring these stations since September, 1971.

The following station locations and watersheds are listed:

Station 1 - Deep Creek Watershed upstream of the old bridge on Deep Creek above the Forest Service Road 237.

Station 2 - Near the junction of Forest Service Road 233 and 237 on Robinson Creek within the Robinson Creek Subwatershed.

Station 3 - Upstream from Forest Service Road 237 on Falling Creek within the Falling Creek drainage.

Station 4 - Within Little Gum Swamp approximately one-half mile before Forest Service Roads 241 and 263 northwest of Ocean Pond.

Station 5 - On the Middle Prong of St. Marys on Forest Service Road 245, approximately one-half mile north of the junction of Forest Service Road 232.

Station 6 - Ocean Pond on Olustee Beach

Station 7 - Ocean Pond below the campsite.

Station 8 - Ocean Pond where Forest Service Road 241c joins the lake.

Station 9 - Near the center of Ocean Pond.

Samples were taken approximately bimonthly from September 27, 1971, to March 5, 1973. The watershed map (Map No. 4, Sec. XI) shows the location of the water quality stations and the watershed boundaries of the different streams. An "overlay" (Map No. 6, Sec. XI) shows the phosphate deposits and the watersheds which would be affected by a mining operation.

The data in Table 2 shows the statistical mode of each parameter analyzed and the measured ranges. The ranges indicate the influence of season and flow changes. Turbidity generally is less than 10 ppm. Except for the organic coloring (tea-colored) from dissolved humic materials, the waters in all streams flow "clear" with very low sediment loads. There is little opportunity for sediment to reach streams because the watersheds are almost entirely forested and the soils are three to four feet thick and consist of 95 percent sand mixed with 5 percent or less silt and clay.

All other quality parameters measured are "within" State Water Quality Rules. Nitrates, phosphates and fluorides exist naturally and the pH is low for the stations at Middle Prong of St. Mary's River, Deep Creek, Robinson Branch, and Falling Creek.

1/ Kittredge, J. Jr., 1958 Forest Influences, McGraw-Hill Book Co., New York, N.Y. 349., illus.

2/ Pride, R.W. 1958. Interim Report on Surface Water Resources of Baker County, Florida. State of Florida Geological Survey, Information Circular 20.

3/ Obtained from the Tallahassee, Florida Office of the USGS, Water Resources Division.

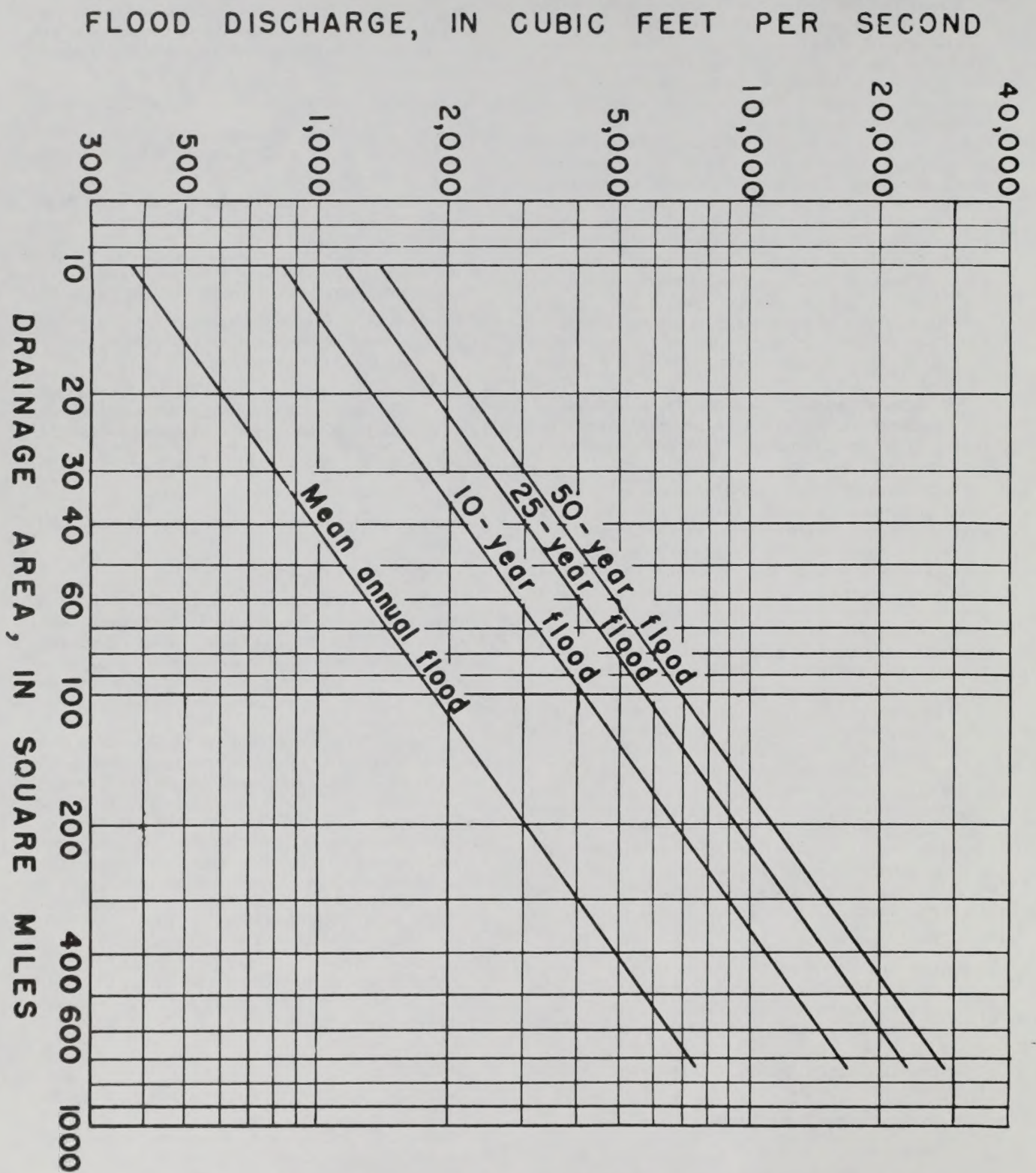


TABLE
OSCEOLA NATIONAL FOREST WATER QUALITY BACKGROUND DATA 1/
Base values as of September 1971-73

Stream or Lake	Total Dissolved Solids as NaCl ppm	Dissolved Oxygen ppm	Nitrogen, Nitrate, and Nitrite ppm	Total Phosphate ppm	Fluoride ppm	Color Apparent	pH Value	Fecal Coliform Col/100 ml	Temp. Range °C	Remarks
Ocean Pond	18 (15-18)	10 (9-13)	8 (2-11)	.05 (.025-.10)	.20 (.2-.7)	170 (60-200)	6.5 (5.6-6.7)	2 (2-110)	17°-26°	Shallow Lake
Middle Prong St. Marys River	24 (23-27)	8 (7-14)	8 (2-11)	.05 (.025-.175)	.30 (.2-.5)	500+ (280-500+)	4.4 (4.2-4.9)	70 (2-70)	12°-23°	Perennial Stream
Deep Creek	25 (22-31)	8 (8-13)	6 (3-11)	.10 (.05-.12)	.40 (.3-.5)	500+ (500-520+)	4.6 (4.1-5.3)	2 (2-33)	13°-24°	Perennial Stream
Robinson Branch	30 (23-32)	9 (8-13)	6 (2-10)	.10 (.02-.10)	.30 (.10-.45)	500+ (450-500+)	4.1 (4.1-4.7)	33 (14-46)	13°-25°	Intermittent Stream
Little Gum Swamp Creek	18 (15-20)	7 (5-7)	6 (2-9)	.05 (.01-.05)	.30 (.2-.35)	200 (170-220)	5.3 (5.0-5.4)	7.8 (2-33)	13°-24°	Intermittent Stream
Falling Creek	30 (21-30)	10 (7-10)	10 (3-11)	.05 (.03-.10)	.30 (.10-.45)	500+ (380-500+)	4.6 (4.4-4.7)	11 (4.5-33)	14°-24°	Intermittent Stream

1/ The statistical mode for each parameter is listed and the range is given in parentheses.

TABLE 3
WELL WATER QUALITY AT OCEAN POND 1/
(USFS WELL — FLORIDAN AQUIFER)

	Olustee		State of
	Campsite	Beach	Florida Rules
	2/(9/65)	3/(6/71)	
Dissolved Oxygen	4/	4/	4
Total Dissolved Solids	227	224	500 mo. av.,/ 1000 anytime
Total Hardness, as CaCO ₃	258	204	
Calcium Hardness, as CaCO ₃	none	120	
Magnesium Hardness, as CaCO ₃	none	84	
Calcium, as Ca	43.4	48	
Magnesium, as Mg	36.4	20	
Alkalinity, (phenol) as CaCO ₃	17	0	
Alkalinity, (Total) as CaCO ₃	305	198	
Carbonate Alkalinity, as CaCO ₃	4/	0	
Bicarbonate Alkalinity, as CaCO ₃	4/	198	
Hydroxides, as OH	4/	0	
CO ₂	Trace	10	
Carbonates, as CO ₃	4/	0	
Bicarbonates, as HCO ₃	4/	242	
Chlorides, as Cl	21.3	0	250
Iron as Fe	0.2	0.1	0.3
Manganese, as Mn	4/	0	
Sulfate, as SO ₄	4.9	5	
Fluorides, as F	4/	0.2	1.4-1.6 (Class I) 10 other
Silica, as SiO ₂	20	2.5	
Copper, as Cu	4/	0	0.5
Phosphate (Total), as PO ₄	4/	0.8	
Color, Cobalt Scale	5	0	
Odor	normal	0	24 at 60° C
pH, Laboratory/pHs	7.65	0	+ 1.0 of normal, 6.0-8.5
Turbidity, Silica Scale	4/	0	50 JTU
Stability Index	4/	6.8	
Bacteria, Coliform Group	4/	4/	2400/100 ml day, 1000/100 ml mo. ave.
Saturation Index	4/	0.4	

1/ Values are in parts per million (ppm) or as indicated.

2/ Excerpt from Pittsburg Testing Lab., Order No. JA-1516,
Lab No. 00200, 8/30/65 Pittsburg, Pa.; 6 in. well, 270 feet
deep.

3/ Excerpt from Orlando Laboratories, Inc., Orlando, Fla.,
sample No. 4533, 6/24/71; 6 inch well, 340 feet deep.

4/ Parameter was not analyzed.

A recent, unpublished, report from the U.S.G.S., April 1973 1/ indicates water quality levels for April 1973 and annual variations since 1969. These data include water quality for two stations (Rocky Creek and Hunter Creek) above a beneficiation-fertilizer plant and Swift Creek below the same plant. Almost all of the parameters for Swift Creek were significantly higher than Rocky Creek and Hunter Creek. Fluorine, nitrogen, nitrate nitrogen, organic and total phosphate values were five to ten times higher than those same parameter values for the streams above the plant. The fluoride level exceeded the State Rules on several occasions throughout the sampling period.

The U.S.G.S. maintains several water quality stations in the Suwannee and St. Marys basins and the data is available from the Ocala, Florida office.

The Osceola has five (5) operating wells (see Watershed Map No. 4 Section XI). Well log data is available at the Forest Service, Tallahassee Office. Table 3 indicates the chemical quality of two wells. No additional water quality data is available for the other three wells, nor for local, private wells.

Water Usage

The Lake City municipal water system serves approximately 16,000 people, and reports the following water pumpage rates:

YEAR	ANNUAL WATER USAGE
1956	365.0 million gallons
1965	456.2 million gallons
1970	627.8 million gallons
1971	609.5 million gallons
1972	645.1 million gallons

In 1956, the City system was supplied by two wells and by 1970, five wells were in operation. These wells are 250-500 feet in depth.

There is no available water usage data for Forest Service and other local wells.

d. Ground water

Geology (Water Bearing Formations)

This is a discussion of the three (3) important aquifers in northern Florida.

The ground water bearing formations extend from the surface to a considerable depth below the phosphate bearing deposits. These rock and the surficial, clastic materials contain the ground water in the area and control its availability, quantity and quality.

For a description of the various rock units refer to Figure No. 12. Figure No. 13 is a geologic cross-section that shows the base of the phosphate matrix, the potentiometric surface, and the top of the Floridan Aquifer in the vicinity of the Osceola National Forest. The water-bearing

1/ Suwannee River Basin Water-Quality Monitoring Program; Sampling Period, April 2-5, 1973. Prepared by U.S. Geological Survey in cooperation with the Suwannee River Authority.

characteristics of the various rock units are described in figure 19, which was compiled from data taken from Meyer, 1962, 1/ and Leve, 1968, 2/. This table indicates the geologic strata, the aquifers and their water bearing characteristics.

Three aquifers of importance for both domestic and industrial water supplies are: the *nonartesian* or water table aquifer (in a zone from the surface to approximately 60 ft. below surface), *secondary artesian* (zone of 60 to approximately 180 ft. below the surface) and the *primary artesian* or Floridan Aquifer (zone of 180 ft. to more than 2000 ft. below the surface). The Ocala group within the Floridan aquifer is the primary, or principal source of water for drinking. The primary or Floridan aquifer supplies, essentially, most of northern peninsular Florida with its water. Lake City obtains its water supply from the Floridan aquifer. The nonartesian and secondary artesian aquifers are the principal source of water of local residents.

Formations below the Floridan aquifer have low permeability, high mineral content and generally are not used for water supplies.

Hydrology (Aquifers)

Where ground water only partially fills an aquifer, the upper surface of the zone of saturation (the water table) is free to rise and fall, and the water is said to be under water table or nonartesian conditions. However, if the ground water is confined beneath a relatively impermeable bed or formation the water surface is not longer free to rise and the ground water is said to be confined under artesian pressure. The height to which the water will rise in tightly cased wells that tap an artesian aquifer is defined as the potentiometric surface of the aquifer. Where the potentiometric surface is lower than the water table, the water can move downward from the nonartesian aquifer into the artesian aquifer or to flowing wells and springs.

Ground water in Columbia and Baker Counties occurs under both nonartesian and artesian conditions.

Nonartesian Aquifer (Water Table)

The nonartesian aquifer is composed primarily of the surficial sands and shallow sediments of Pleistocene and Recent Age. However, in some areas water table conditions also exist in the Miocene or Pliocene sands, clay, and limestones, and Floridan aquifer.

Local rainfall is the source of recharge to the nonartesian aquifer. The water table rises during periods of excessive rainfall and declines during periods of drought. Seasonal fluctuations of six to eight feet are not uncommon. Some wells completed in the upper part of the aquifer go dry when water levels decline and must be deepened. The water table conforms generally to the topography of the area; however, its features usually are more subdued.

Discharge from the nonartesian aquifer results from evaporation, transpiration by plants, seepage into streams and lakes, leakage into the underlying Hawthorn Formation and pumpage from a few wells.

Evidence of downward percolation is the decrease in water table altitude with increase in depth of cased wells and total well depths. For example, this occurs in wells north of Lake City.

The east-west trending topographic divide that crosses the area through Lake City is probably also a ground water divide for the nonartesian aquifer.

The nonartesian aquifer beneath the Okefenokee Swamp, north of the divide including much of the Osceola National Forest in Columbia County, is comprised of 10 to 30 feet of fine sand. It is recharged from local precipitation, surface water and ground water inflow from the higher east-west trending ridge to the south. In the relatively flat National Forest, the water table is above or within a few feet of the land surface most of the year.

The nonartesian aquifer on the high terraces south of the east-west ridge is composed of about 5 to 50 feet of fine to coarse sand and clay or phosphate pebbles above the Hawthorn Formation. It is recharged by local precipitation, surface water and ground water inflow from the higher east-west trending ridge to the north.

The nonartesian aquifer in areas lower than 100 feet in elevation (Suwannee River Valley) is comprised of 5 to 10 feet of sand, except where the sand has filled solution cavities and is therefore thicker.

The chemical quality of the water in the nonartesian aquifer generally is good, but locally contains iron and tannic acid.

The water temperature of the nonartesian aquifer, the nonartesian zones of the Floridan aquifer, and the secondary artesian zones in the Hawthorn Formation ranges from approximately 69° to 71° F.

Secondary Artesian Aquifer

The secondary artesian aquifer locally consists of the Hawthorn Formation, undifferentiated upper Miocene or Pliocene deposits and the Alachua Formation. The Hawthorn is the more extensive and is indistinguishable from the Alachua Formation in some localities.

Generally, the secondary artesian aquifer includes many thin, permeable zones within the Hawthorn Formation. These zones are principally limestone or sandstone beds interbedded with sand and clay.

The occurrence of secondary artesian aquifers varies throughout the area and the exact depth and thickness of the aquifers at any location cannot be estimated without test drilling. In a test near Sanderson, secondary artesian aquifers were located at depths of 70 to 90 feet below land surface near the base of the upper Miocene or Pliocene deposits and from 130 to 140 feet below land surface and 160 to 180 feet below land surface in the Hawthorn Formation. In a test well near Taylor, secondary artesian aquifers were located at depths from 200 to 220 feet below land surface and from 330 to 380 feet below land surface in the Hawthorn Formation.

Ground water within the aquifers can come from local rainfall, downward seepage from the overlying nonartesian aquifer or, in some areas, from upward leakage from the underlying Floridan aquifer. The potentiometric surface of the secondary artesian aquifer varies with its depth and is generally intermediate in altitude between the water table of

1/ Meyer, Fredrick W., 1962, Reconnaissance of the Geology and Ground Water Resources of Columbia County, Florida Geological Survey Report of Investigations No. 30.

2/ Leve, Gilbert W., 1968, Reconnaissance of the Ground Water Resources of Baker County, Florida; State Board of Cons., Division of Geology Report of Investigations No. 52.

GEOLOGIC UNITS AND THEIR WATER-BEARING CHARACTERISTICS						
ERA	SYSTEM	SERIES	FORMATION	APPROXIMATE THICKNESS	AQUIFER	WATER-BEARING PROPERTIES
Cenozoic	Quaternary	Recent	Unnamed lake, alluvial, and windblown material	0 to 10'-20'	Nonartesian aquifer	Recent and Pleistocene strata are of limited extent and are used locally for domestic water supply. They also function as a temporary storage reservoir for water which percolates into the underlying formations. Other characteristics are: low permeability due to fine grain size; small yields for domestic use; iron may stain fixtures red; water under nonartesian or perched nonartesian conditions.
		Pleistocene	Marine terraces	Variable, max of 40'		
	Tertiary	Pliocene and/or Miocene	Pliocene and/or Miocene sediments undifferentiated ?Alachua Fm. ?	Variable, max of 45'	Secondary artesian aquifer	The upper Hawthorne and overlying beds are water-bearing, however, the thick, sandy clays and clays are relatively impermeable and confine water in the underlying Floridan aquifer. The permeable beds are tapped by wells for for domestic supplies, but this secondary artesian aquifer is not considered an important source for large quantities of groundwater. Other characteristics are: variable permeability; acts as semiconfining bed; Hawthorn Fm. yields small to moderate quantities of water to wells tapping low pressure artesian limestone strata. Chemical quality of the water is usually good at depth.
		Miocene	Hawthorn Formation	100' to 250'		
		Oligocene	Suwannee Limestone	0 to 40'	Primary artesian aquifer (Floridan Aquifer)	The lower part of the Hawthorn is characterized by limestone and sandstone (Miocene Sandstone and Limestone of Meyer, 1962). Where the Miocene sandstone and limestone unit is saturated, it forms the upper part of the Floridan Aquifer. Although this unit may differ in permeability from place to place, it is a fair source of groundwater. Other characteristics are: permeability moderate to high; serves as a good source of water; locally the water has a high iron content.
		Eocene	Ocala Group	200' to 275'		The limestone of the Suwannee is a permeable and porous part of the Floridan Aquifer. Other characteristics are: permeability high except in localized chert zones; yields large quantities of water to wells. Formation not always present.
			Avon Park Limestone	90' to 160'		The Ocala Group is the principal source of potable ground water in northern Florida. Other characteristics are: permeability is high to very high; serves as the source of water for most large-capacity wells; water is moderately hard; H ₂ S is present where water is under artesian pressure.
			Lake City Limestone	500'		The Avon Park is a permeable and porous part of the Floridan Aquifer. Other characteristics are: permeability is high; not used extensively for water supply; water very hard.
			Oldsmar Limestone	300' to 350'		The Lake City Limestone is a part of the Floridan Aquifer, but it contains water high in sulfates near its base. Other characteristics are: permeability low to high; seldom used for water supply.
		Paleocene	Cedar Keys Formation	400' to 450'	Aquifer not suitable for use	The Oldsmar Limestone is hydraulically connected to the underlying Cedar Keys Fm. and the overlying Lake City Limestone. Other characteristics are: permeability is low but locally may be high; is not used as a water supply; water contains high concentrations of dissolved minerals, particularly sulfates.
						The permeability of the Cedar Keys Fm. is low, but may be locally high in the upper portions. Because of the high dissolved mineral content, the formation is not used for water supply.
Meso-zoic	Cretaceous					

the nonartesian aquifer and the potentiometric surface of the Floridan aquifer. The concentrations of dissolved solids and total hardness of the water generally increase with depth in the secondary aquifer.

Floridan Aquifer

In Florida, the primary artesian aquifer has been designated the "Floridan aquifer." It consists of the Lake City Limestone, Avon Park Limestone, the Ocala Group, the Suwannee Limestone and an unnamed sandstone and limestone of Miocene Age.

The Floridan aquifer occurs beneath all of the area. Impermeable beds of the Hawthorn formation and Pliocene or Miocene deposits overlay the aquifer and confine the ground water in the underlying limestone. These beds create the artesian condition. The altitude of the top of the aquifer ranges from approximately 80 feet above mean sea level in the southern part of Columbia County to more than 150 feet below mean sea level in Baker County (See Figures 20 and 21).

The thickness of the aquifer ranges from about 900 feet in the southern part of Baker County to more than 2000 feet in central Baker County. Generally, only the upper few hundred feet of the Aquifer are tapped by wells in the area.

The Floridan aquifer is capable of providing large quantities of ground water for municipal, industrial, and agricultural use, and is the principal source of ground water throughout all of northern Florida and southern Georgia. Natural discharge from the Floridan aquifer maintains the perennial, or base, flows of the Santa Fe, Ichatucknee, and Suwannee Rivers in northern Florida.

An analysis of pumping tests at Lake City indicates that the upper 200 feet of the Floridan aquifer has a transmissivity coefficient of approximately 270,000 gallons per day per foot and a storage coefficient of about 0.0008. The upper 240 feet of the aquifer in western Baker County has a transmissivity of 100,000 gallons per day/ft. The analysis of the specific capacities of selected wells indicates that transmissivity probably decreases with depth and increases toward the discharge areas in the southern part of the county.

The Floridan aquifer is artesian in all of Baker County and in the northern part of Columbia County. It is nonartesian in the southern part of Columbia County as far north as Lake City. The extent of the nonartesian area changes with the fluctuation of the amount of water in storage in the Floridan aquifer.

Ground Water Movement and Recharge

The configuration and altitude of a potentiometric (piezometric) surface are represented by contour lines which connect points of equal pressure. Generally, water enters the aquifer wherever the potentiometric surface is below the water table and moves downgradient in a direction approximately perpendicular to the contour lines. The velocity of the ground water movement depends on the permeability of the aquifer and the hydraulic gradient.

Figure 22 shows the potentiometric surface of the Floridan aquifer in Columbia County in June 1957 and Figure 23 shows the general potentiometric surface in northeastern Florida in March 1964.

As indicated in these figures, the movement of water through the aquifer generally is westward to southwestward

in western Baker and in eastern Columbia Counties. The relatively uniform slope of the potentiometric surface is interrupted by high and low areas caused by local recharge and discharge. Locally, the direction of flow may differ from the regional direction.

Recharge to the Floridan aquifer occurs both in Columbia and Baker Counties where the surface water and water in shallower aquifers stands than the potentiometric surface of the Floridan aquifer. In some areas, the Floridan aquifer is at or near the surface or the aquifer is exposed by sinkholes that penetrate the confining beds. In these areas rainwater and water from surface streams may enter the Floridan aquifer directly. Such an area is indicated by the potentiometric high along Falling Creek southeast of White Springs (Figure 22).

Recharge of the aquifer from rivers and streams occurs during high stages of the Suwannee River (see Figure 24). The direction of flow is from the river to the aquifer where the surface of the river is higher than the potentiometric surface of the aquifer. The direction of flow is reversed when the potentiometric surface is higher than the water level of the river. Such recharge may only be seasonal and depends on the relationship of the altitude of the potentiometric surface with the altitude of the surface water.

The type of recharge that probably occurs throughout most of eastern Columbia and southern Baker Counties is by water from the nonartesian and secondary artesian aquifers entering the Floridan aquifer by downward leakage through the confining beds.

5. Climate and Air Quality

Climate

The climate of the general area is humid, subtropical. The average annual *temperature* for the 90-year period of record is 69.0 degrees F. The coldest month, January, averages about 55.6 degrees F. with occasional periods of freezing. The warmest month is August, averaging 81.1 degrees F. The usual date of the first killing frost is November 25, and the last killing frost is around March 4. A record low of 2 degrees F. below zero was recorded at Tallahassee on February 3, 1899. The growing season is approximately 260 days.

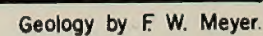
According to the National Weather Service, the average annual *rainfall* at Lake City for the period of record is 51.0 inches. Rainfall is greatest from June through September and least from December through February. Most of the summer rainfall is derived from convectional cells which often produce intense thundershowers for an hour or two during the hottest part of the day. Severe showers occasionally produce hail, and, when accompanied by strong winds, can inflict serious damage to crops and property. These storms produce the greatest erosion, sedimentation and flooding problems when the soil is exposed, and soil moisture and water tables are high. "Immediate" surface flood flows are generated. As many as 80 such thundershowers, varying in intensity, can occur each year.

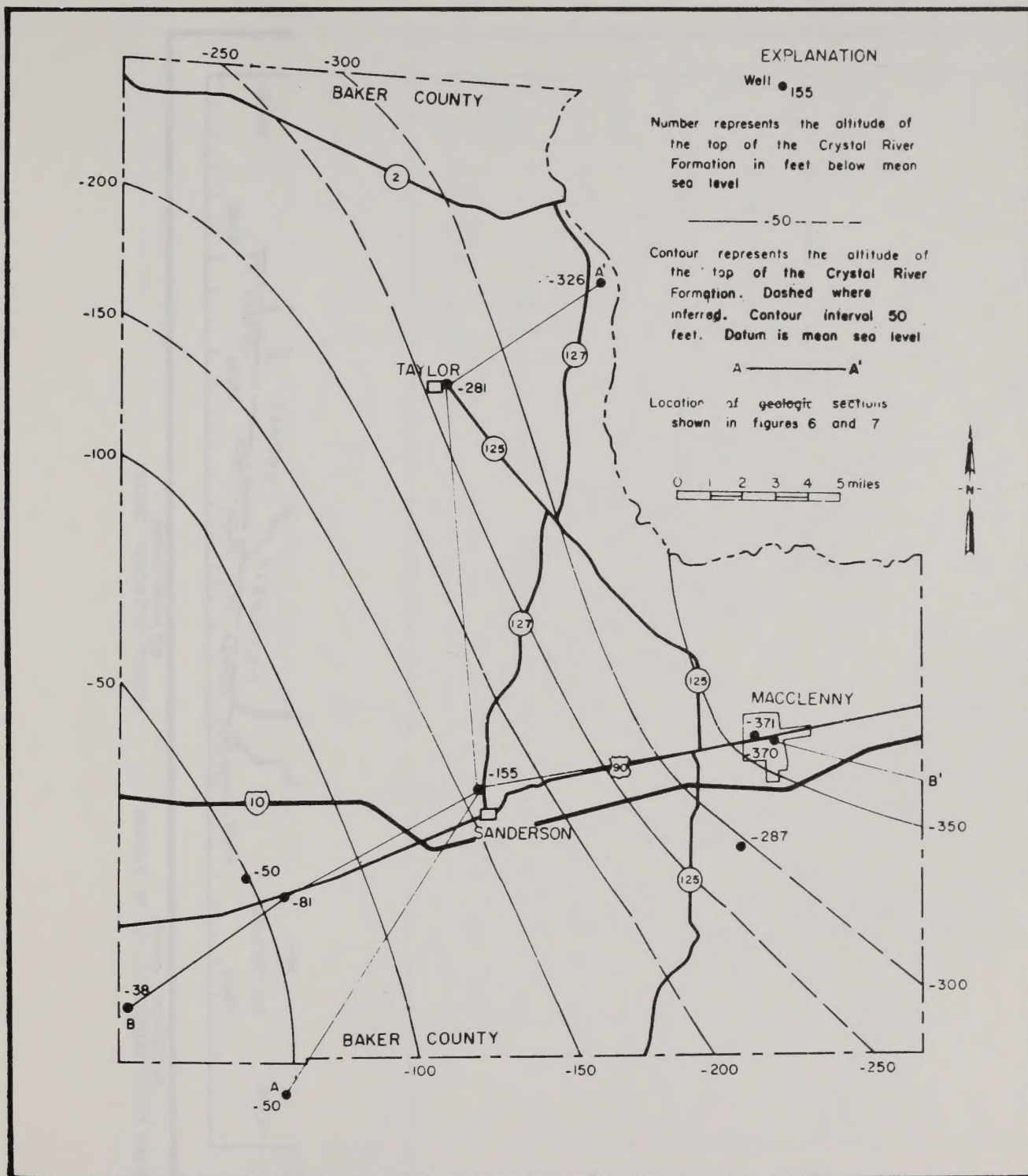
Snowfall is unusual, but two to three inches was recorded in 1958.

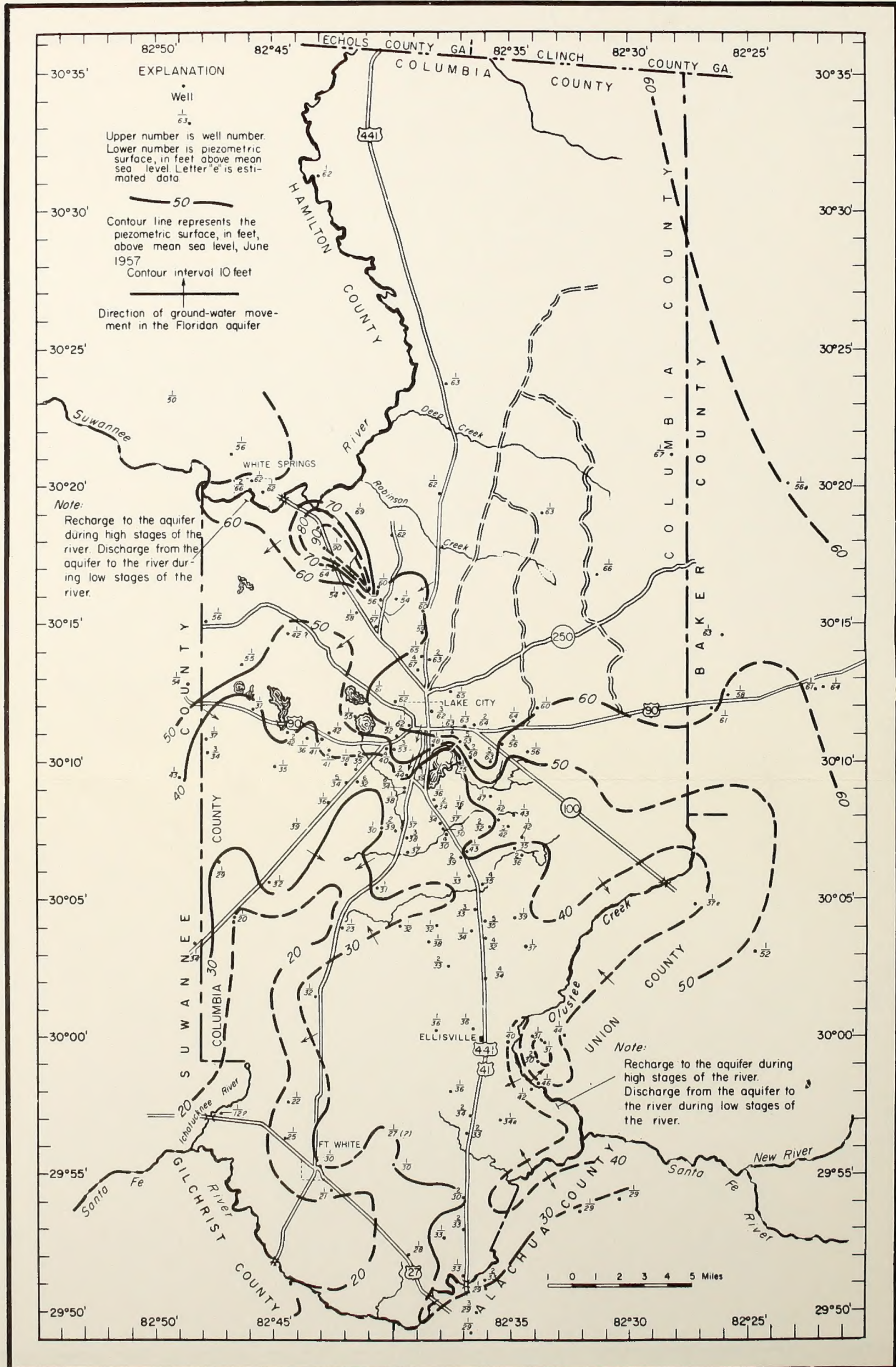
The average *humidity* is 50 percent.

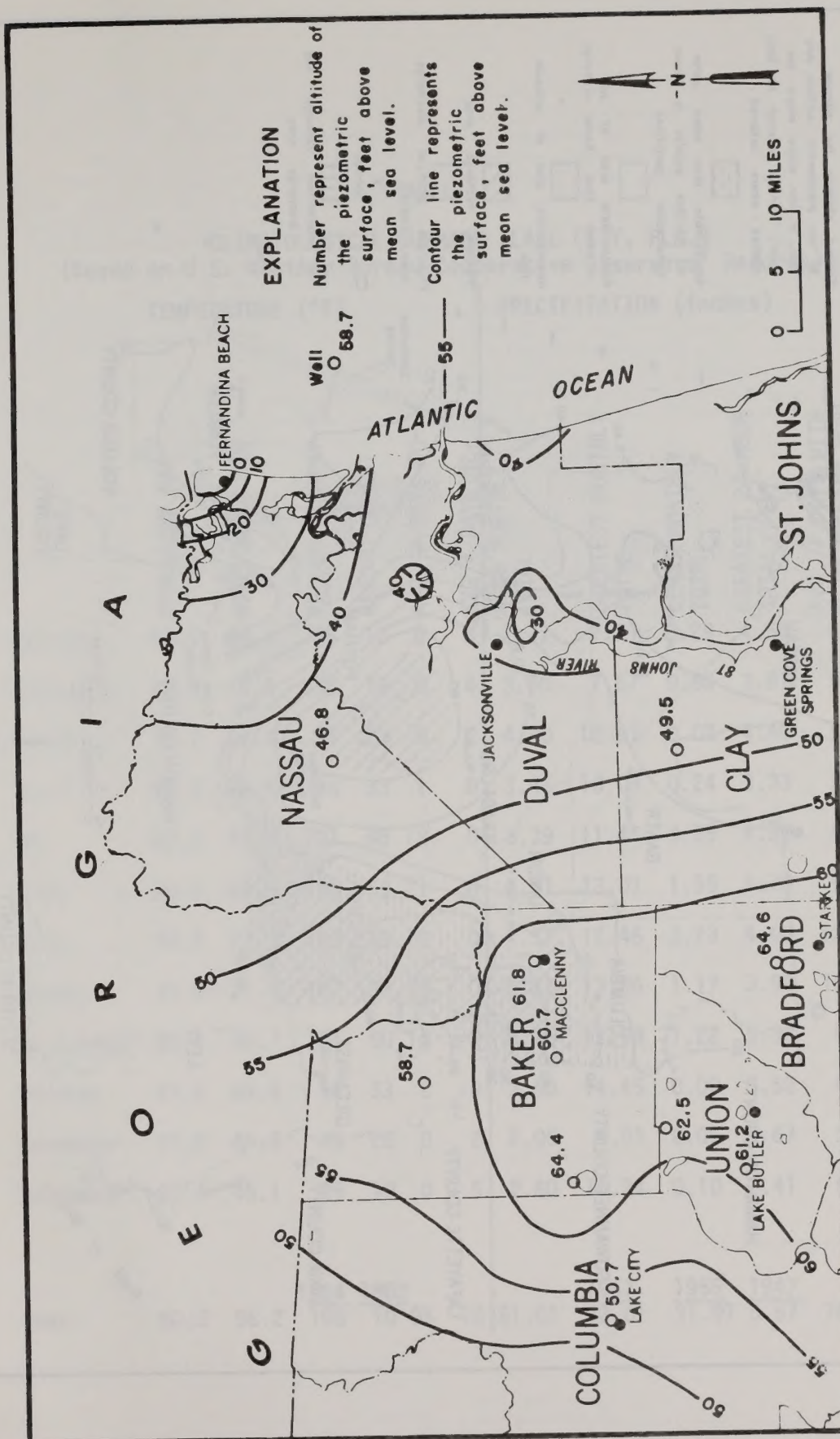
A climatological summary is included in the accompanying table 4.

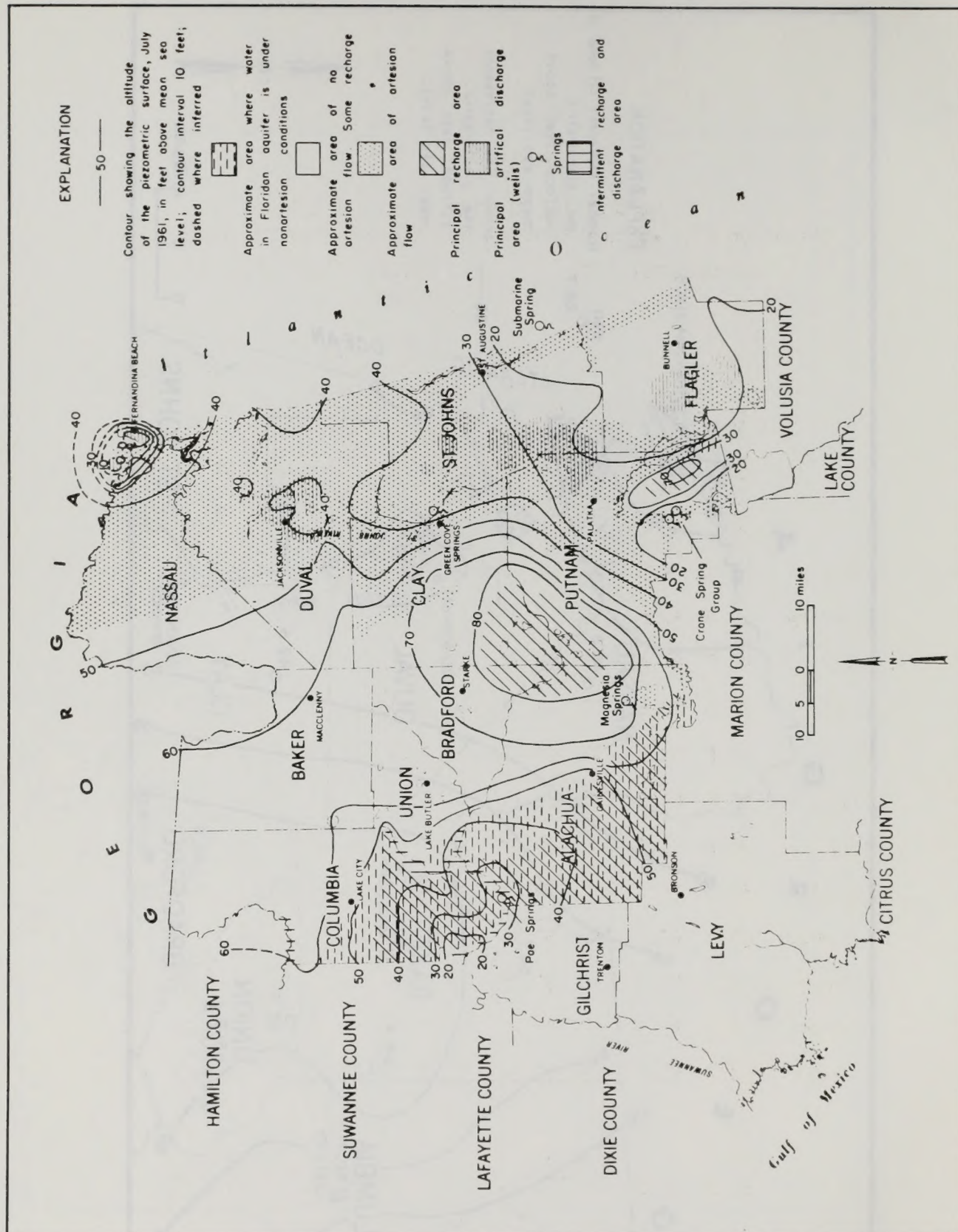
Prevailing *winds* are generally influenced in this area by











TABLE

CLIMATOLOGICAL SUMMARY (LAKE CITY, FLA.)
 (Based on U.S. Weather Bureau Cooperative Observers' Records)

	TEMPERATURE (°F)						PRECIPITATION (inches)				
	AVG. DAILY MAX	AVG. DAILY MIN	RECORD HIGHEST	RECORD LOWEST	AVG. # DAYS 90+	AVG # DAYS 32-	AVG. MONTHLY TOTAL	GREATEST MONTHLY TOTAL	LEAST MONTHLY TOTAL	GREATEST 24-HOUR TOTAL	AVG. # DAYS WITH 0.10 INCH OR MORE
January	67.6	44.6	85	16	0	5	2.77	7.71	0.29	4.50	5
February	69.9	46.6	88	19	0	4	3.50	7.67	0.50	3.87	5
March	74.7	51.4	96	23	0	2	4.00	12.61	0.02	4.40	5
April	80.8	56.5	94	33	1	0	3.46	10.03	0.24	3.33	5
May	87.2	63.5	101	45	12	0	3.39	11.45	0.85	4.52	5
June	90.6	69.5	105	53	21	0	5.91	13.01	1.55	4.70	9
July	90.8	71.3	102	59	22	0	7.57	12.45	3.73	4.00	12
August	91.0	71.4	101	59	23	0	6.71	13.86	1.17	3.90	10
September	88.1	68.7	101	50	14	0	5.45	12.94	1.22	5.32	8
October	81.2	59.8	96	33	2	0	3.60	14.45	0.00	5.52	4
November	73.0	49.9	89	20	0	2	2.05	9.01	0.05	5.67	3
December	67.4	45.1	85	10	0	5	2.60	10.24	0.10	2.41	5
Year	80.2	58.2	<u>1954</u> 105	<u>1962</u> 10	95	18	51.01	<u>1947</u> 82.01	<u>1955</u> 31.97	<u>1947</u> 5.67	76

convictional forces and are erratic. Generally the winds are northerly from September through March and southerly from April through August. March and April are the windiest months. High local winds of short duration occur occasionally and often with cold, frontal storms. Table 5 and Appendix 17 illustrate wind direction and velocity at the nearest weather station (USFS, Olustee Fire Tower).

Tornadoes, which may occur at any time of year, are most frequent in spring. Generally, the tornado paths are short and not much damage is caused.

Tropical storms cause the most destruction to life and property of any of the climatic phenomena. One-hundred and thirty storms have occurred in Florida from 1885 to 1961. Fifty-five were hurricane intensity (73-136 mph, Beaufort Scale). For the general area the probabilities of hurricane occurrence in any given year are 1/:

Apalachicola-St. Marks	1 in 15
Daytona Beach	1 in 30
Jacksonville	1 in 50

Tropical storms usually occur from August through October and are often accompanied by intense rains of twenty-inches or more in a 24-hour period. Figure 25 indicates that 10 to 15 tropical storms have caused destruction in the Lake City-Osceola National Forest vicinity during the period, 1901 to 1955.

Air Quality Laws

The State of Florida has established ambient air quality emission rules. (See Section IV - Mitigation, and the Appendix No. 4). 2/

Osceola National Forest - Ambient Air Quality

The present quality of the air over the Osceola National Forest has not been determined by either the Environmental Protection Agency or the Florida State Department of Pollution Control.

The primary industries in the Lake City - Osceola National Forest Area are mobile home manufacturing, an airplane modification and maintenance factory, and the Occidental Petroleum Phosphate Company at White Springs.

Visitors travelling in and about the National Forest in automobiles, and general burning produce the only present direct impact on the air quality in the Forest area. Prescribed burning for resource management purposes causes some minor impairment of the quality. This operation is carried out only during a few days each year when conditions are favorable for prescription burning.

Except for these intermittent and/or seasonal emissions, the ambient air quality for the National Forest and vicinity is relatively high.

B. Living Components

1. Vegetation

Vegetative types developed as the ocean receded during the Pleistocene Age. As soils formed, plants adapted to particular soil conditions, reproduced, and gradually increased their range as conditions permitted. Frequent fire occurrence had a strong influence on vegetation composition over time, and maintained sub-climax species (pine flatwoods type) over much of the area. Slash pine,

being less tolerant to fire than longleaf, became established in the lower, wetter areas and around pond margins where fire occurred less frequently or burned with less intensity than in the higher, better drained areas.

Vegetation is the most significant visual feature of the Osceola National Forest. A flat landscape, such as exists on the Forest, if devoid of vegetation would provide at best, an extremely bleak environment for man or beast. At ground level the vegetation is the primary determinant of form, line, color and texture that man observes. Form is seen in the individual trees, small groups of trees, masses of shrubs, etc., line in the vertical trunks of trees, and individual limbs and branches, color in all parts of the vegetation and texture in the surface of tree bark, leaf surfaces and, from a distance, the collective effect of masses of leaves, grasses, etc.

From above, vegetation is observed as form or shape - in groupings of vegetation types, line - in the edges of types and stream courses, color - in all aspects of the vegetation and texture in the surface of the tree or overstory masses.

The vegetation is of significant direct economic importance to man. Indirectly it is important as habitat for wildlife, and as a source of aesthetic benefits. Commercial uses of the resource by man include (1) trees as raw material for buildings, paper, fiber and chemical products, (2) grasses and herbaceous shrubs for beef cattle production, (3) nectar from plant blossoms for honey production, and (4), to a very limited extent, herbs and roots for aromatic or seasoning purposes.

Vegetation on the Osceola National Forest consists generally of three types. These are the Pine Flatwoods, Cypress Swamps, and Creek Swamps. A complete listing of common plant species for flatwoods and swamps is in Appendix 8.

Pine Flatwoods Types

The Pine Flatwoods type covers generally the higher, better drained areas and is the most common type on the Forest. Pine flatwoods make up about 70 percent of the National Forest or about 38,000 acres of the potential lease area.

Two community phases - Longleaf Pine (*pinus palustris*) (See photo 13) and slash pine (*pinus elliotii*) (see photo 14) are recognized within the Pine Flatwoods Type. These phases are sub-climax and are maintained in this successional stage by fire. Generally the longleaf phase occurs on the drier soils within the type with the slash pine phase occupying the wetter areas and pond margins. On the Osceola, slash pine predominates on about 68 percent of the total pine type area. Longleaf covers about 32 percent of the total type. Most of the longleaf on the Osceola occurs in the western one-third of the Forest, while slash pine is found more frequently in the eastern two-thirds.

Understory and ground cover vegetation varies from phase to phase within the type. The most common understory species within the longleaf phase include saw palmetto, gallberry, to a lesser extent runner oak and wiregrass. Waxmyrtle and yaupon are less common

1/ Climate of the States. Florida. U.S. Dept. Comm., ESSA Climatology of the U.S., No. 60-8. March 1959.

2/ Rules of the State of Florida, Dept. of Pollution Control Chapter 17-2, Air Pollution, Supplement No. 16 (no date).

TABLE 5

MEAN ANNUAL WIND VELOCITY AND DISTRIBUTION OF WIND DIRECTION
OSCEOLA NATIONAL FOREST, 1971-1972

AZIMUTH	1971				1972			
	ΣV	N	N/2	\bar{V}	ΣV	N	N/2	\bar{V}
N	151	21	10.5	7.2	232	37	18	6.3
NE	258	44	22	5.9	256	43	22	6.0
E	80	17	8	4.7	123	26	13	4.7
SE	123	25	12	4.9	197	31	16	6.4
S	310	51	26	6.1	190	31	16	6.1
SW	415	70	35	5.9	551	95	48	5.8
W	337	54	27	6.2	205	33	16	6.2
NW	246	42	21	5.8	96	19	10	5.1

ΣV = Arithmetic sum of velocities for a particular azimuth for the year.

N = Number of observations of a particular azimuth for the year.

N/2 = "N" divided by 2. This was done for convenience of plotting the distribution of the wind direction data.

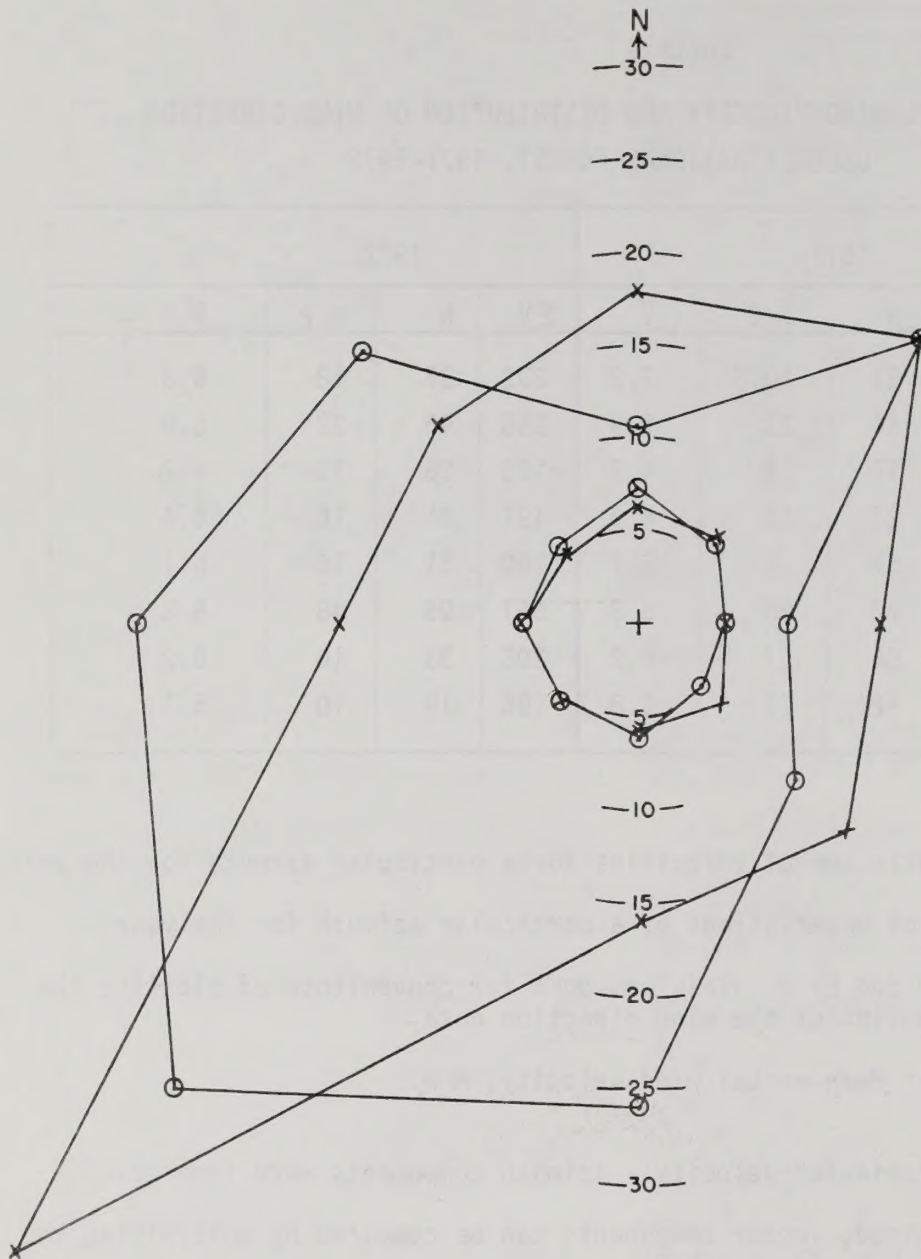
\bar{V} = $\Sigma V \div N$ = Mean annual wind velocity, MPH.

Note: (1) All "Variable" velocity - azimuth components were ignored.

(2) If desired, vector components can be computed by multiplying the \bar{V} times N, (or 2 x N/2).

TABLE 5 cont.

MEAN ANNUAL WIND VELOCITY AND DISTRIBUTION OF WIND
DIRECTION - OSCEOLA NATIONAL FOREST - 1971-1972



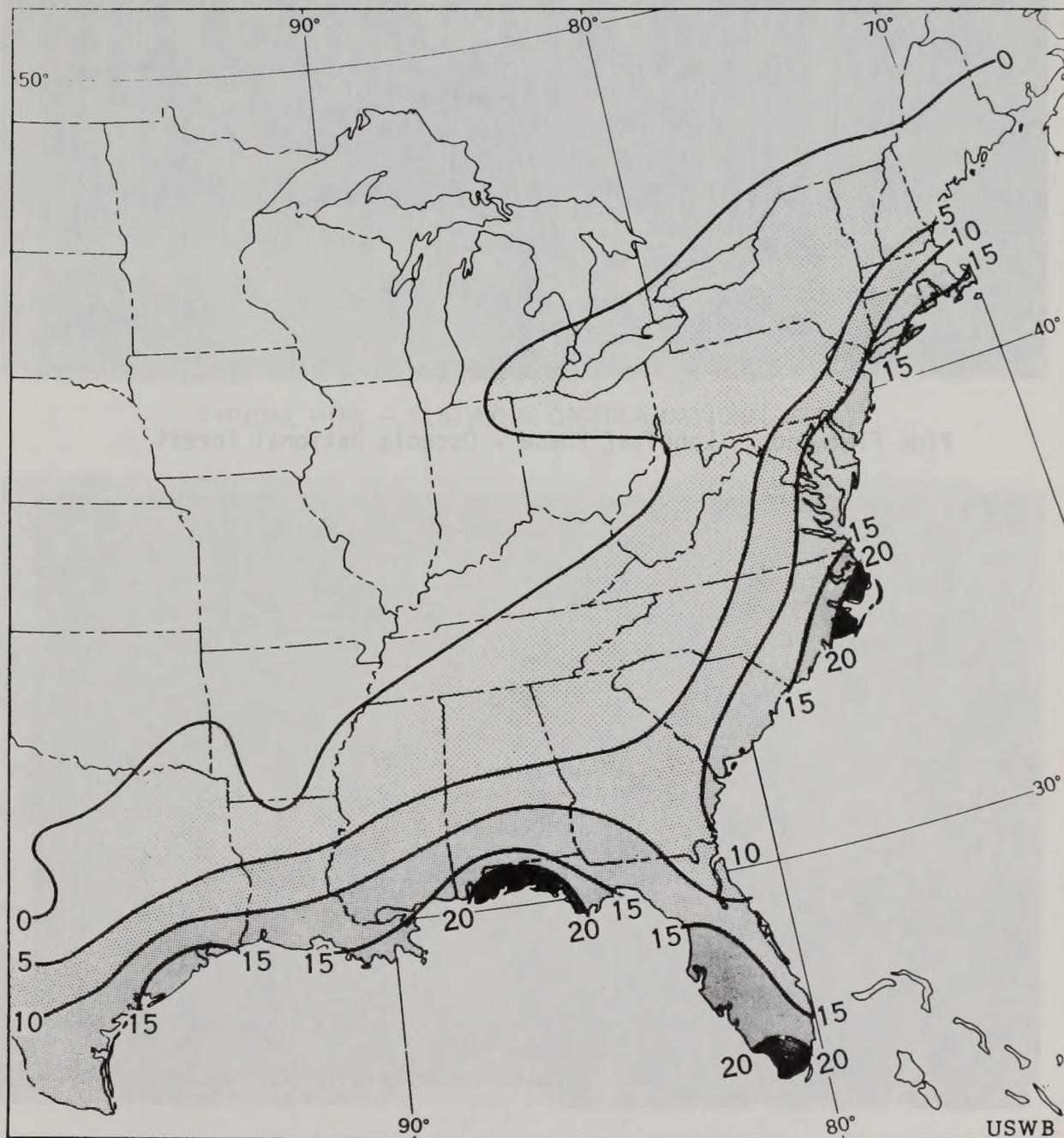
MEAN ANNUAL WIND VELOCITY, MPH (INNER 2 CIRCLES)

○-○ 1971; X-X 1972

FREQUENCY OF WIND DIRECTION (OUTER 2 CIRCLES)

○-○ 1971; X-X 1972

Number of Times Destruction was Caused by Tropical Storms, 1901-1955





Pine Flatwoods - Longleaf Phase - Osceola National Forest



Pine Flatwood Type - Slash Pine Phase - Osceola National Forest



TYPICAL PINE - FLATWOODS OSCEOLA NATIONAL FOREST



DEEP CREEK - A MAJOR DRAINAGE OSCEOLA NATIONAL FOREST

associates. Runner oak and wiregrass are the most common ground cover species.

In the slash pine phase, understory species composition is somewhat similar to that for longleaf except for gallberry being the most conspicuous, replacing saw palmetto as the dominant species. Other common shrubs found frequently within the slash phase are waxmyrtle, fetterbush, yaupon and blueberry. Wiregrass is the most common ground cover species.

Succession in the flatwoods type is varied. In the longleaf and the drier slash pine phases, succession is toward the mixed hardwood community. The wetter slash sites trend toward the bay swamp type, or where soil fertility is higher, the mixed hardwood type.

Economic benefits of this type rank first in comparison to the other types on the Osceola. Ninety percent or more of the commercial timber sold from the forest comes from this type in the form of pine sawtimber and pulpwood.

COMMON UNDERSTORY SPECIES PINE FLATWOODS TYPE

Longleaf Phase

Saw palmetto	(<i>Serenoa repens</i>)
Runner Oak	(<i>Quercus minima</i>)
Vaccinium	(<i>Vaccinium spp.</i>)
Gallberry	(<i>Ilex spp.</i>)
Oaks	(<i>Quercus spp.</i>)
Fetterbush	(<i>Lyonia lucida</i>)
Waxmyrtle	(<i>Myrica arifera</i>)
Ferns	(<i>various genera and spp.</i>)
Smilax	(<i>Smilax spp.</i>)
Wiregrass	(<i>Aristida spp.</i>)
Panic grass	(<i>Panicum spp.</i>)
Bluestem	(<i>Andropogon spp.</i>)
Low paspalums	(<i>Paspalum spp.</i>)
Carpetgrass	(<i>Axonopus affinis</i>)
Common Lespedeza	(<i>Lespedeza spp.</i>)

COMMON UNDERSTORY SPECIES PINE FLATWOODS TYPE

Slash Pine Phase

Gallberry	(<i>Ilex glabra</i>)(Most Common)
Saw palmetto	(<i>Serenoa repens</i>)
Vaccinium	(<i>Vaccinium spp.</i>)
Fetterbush	(<i>Lyonia lucide</i>)
Yaupon	(<i>Ilex vomitoria</i>)
Waxmyrtle	(<i>Myrica cerifera</i>)
Runner oak	(<i>Quercus minima</i>)
St. Johns Wort	(<i>Hypericum spp.</i>)
Smilax	(<i>Smilax spp.</i>)
Wiregrass	(<i>Aristida and Sporodolus spp.</i>)
Panic grass	(<i>Panicum spp.</i>)
Bluestem	(<i>Andropogon spp.</i>)
Ferns	(<i>various genera and spp.</i>)

The above species are arranged generally in order of general frequency of occurrence except for the grasses.

Cypress Swamp Types

This type consists of two phases and is the second largest type on the Osceola occupying about 18 percent of

the National Forest or about 8000 acres of the lease area with baldcypress (*Taxodium distichum*) or pond cypress (*Taxodium ascendens*) dominant. Baldcypress-blackgum phases (see photo 15) are found in the larger, deeper swamps where soils are more fertile and less acid. Pond cypress (see photo 16) occurs on acid infertile soils in shallow ponds. Pond cypress is much more frequently found on the Osceola and is the species that makes up the so called "cypress domes." Such "domes" are usually roundish or oval in shape and appear dome-shaped because the tallest trees are found in the center with progressively shorter trees toward the edge. The most common trees in the type are blackgums, slash pine, sweetbay, red bay, red maple, bayberry, fetterbush, gallberry, holly and buttonbush. Blackgum sometimes forms a tall understory or in many cases merges with cypress crowns in the baldcypress-blackgum phase.

COMMON UNDERSTORY SPECIES — CYPRESS SWAMP TYPE

Pond Cypress Phase

Virginia chain fern	(<i>Woodwardia virginica</i>)
Fetterbush	(<i>Lyonia Lucida</i>)
Poison ivy	(<i>Rhus radicans</i>)
Bamboo Briar	(<i>Smilax lauifolia</i>)
Virginia Willow	(<i>Itea virginica</i>)
Sphagnum moss	(<i>Sphagnum spp.</i>)
Muscadine	(<i>Vitis rotundifolia</i>)
Sweetbay	(<i>Magnolia virginia</i>)
Loblolly Bay	(<i>Gordonia lasianthus</i>)

Baldcypress - Blackgum Phase

Generally the same as pond cypress phase except acid-loving plants and trees, such as sweetbay and loblolly bay, are less prevalent.

About 60 percent of the Cypress Swamp type is estimated to be in Pond cypress phase with Baldcypress-blackgum phase occupying the remainder.

Successional trend in the cypress swamp type is toward the mixed hardwood type.

The swamp type contributes greatly to the aesthetic environment and as much to wildlife habitat. The diversity the types provide for visual and habitat purposes equals or exceeds that of any of the other vegetative types. The type contributes habitat for certain rare and endangered species such as the Florida black bear and the Florida panther. Alligators use the potholes as do various types of waterfowl. This area lies just south of Pinhook Swamp and is actually a part of the Okefenokee Swamp complex.

The soil/vegetation association map does not differentiate the two phases in this type.

This type is second to pine flatwoods in economic benefits. One sawmill near the Forest is dependent on the type for its operation. The volume sold from this type is about 5 percent of the volume sold from the Forest each year.

Creek Swamp Type

This type occupies about 12 percent of the National Forest or about 6,000 acres of the lease area. This type consists of mostly sweetbay, blackgum, and red maple and is found on gentle slopes bordering small creeks. (See photo 17) Loblolly pine, cypress, water oak and sweetgum



Cypress Swamp Type - Baldcypress Blackgum Phase
Osceola National Forest



Cypress Swamp Type - Pondcypress Phase Osceola National Forest



Creek Swamp Type - Osceola National Forest

(occasionally) are common associates in the overstory. The understory consists of pinckneya, (*Pinckneya Pubescens*), viburnum (*Viburnum cassinoides*), buttonbush (*Cephalanthus occidentalis*), azalea (*Rhododendron pubescens*) and blackberry (*Rubus betulifolius*), and a host of other minor species of plants.

The type is the most floristically variable of any on the Osceola. It represents the climax vegetational type in the Forest. At present management levels, the Creek Swamp type contributes little to commercial timber economic benefit but considerably to aesthetic, wildlife habitat and other intangible benefits.

The Aquatic Community

The aquatic community is limited to the relatively few lakes and the numerous streams on the Osceola Forest and occurs as inclusions in the Creek and Swamp types. (See photo 18) Both the lakes and streams are dark water, relatively acid environments with a low productivity in terms of total biomass produced per acre of water. Common vegetation in lakes and streams includes aquatic plants which exist only in the water as well as those which exist with a direct dependency on frequent flooding. The plant species are generally the same as listed in the swamps section.

The following plants are protected by Florida's Rare Plant Law, Chapter 65-426 section 865.06, and occur in the proposed mining area: some of the ferns, orchids, pitcher plants, red bud, dogwood, loblolly bay, American holly and wild azaleas. The Rare Plant Law with complete plant listings is in appendix 5.

2. Wildlife and Fisheries 1/

The Osceola National Forest consists of 157,231 acres, of which 118,000 acres are managed pine woodland and the remainder is swampland, bays, ponds and creek bottoms. These wetland areas and hardwood-hammocks are the most valuable wildlife habitat in the Forest, having a variety of vegetation that provides most of the food and much of the cover needed for any successful wildlife management program. The Forest represents a very complex ecological grouping with hundreds of different organisms. Many years were required for the hammocks to reach the point where they provide scenic beauty and areas for consumptive and non-consumptive uses of wildlife.

The entire Forest is a Wildlife Management Area, managed cooperatively by the Florida Game and Fresh Water Fish Commission and the Forest Service. The Forest is open to public hunting. Although the area receives some out-of-State hunting use, the bulk of the hunters are from the Lake City and Jacksonville areas.

Each year more and more forest visitors come to the Osceola National Forest for wildlife observation, nature study, and outdoor experiences away from urban areas. These are important non-consumptive uses.

The Osceola National Forest is excellent habitat for white-tail deer, turkey, black bear, and gray squirrel. Quail and migratory waterfowl also exist in somewhat less than desirable population densities.

Hunting and fishing activity on the Osceola National Forest is high. In 1971, fishing accounted for 13,000 visitor-days use. (One Visitor Day means 12 hours use on the Forest.) Hunting accounted for 12,200 visitor-days use primarily during the seven-week deer season.

The Florida Game and Fresh Water Fish Commission has determined that the major portion of the Osceola National Forest north of Interstate 10 and a small pocket in Little Gum Swamp is the best bear habitat. (See Section XI, Map No. 8). This area supports approximately 20 percent of the State's remaining bear population. About 60 percent of the Osceola Forest bear habitat is within the permitted area.

Estimated game populations for the National Forest are as follows:

- a. Deer: 2,000 - 3,000
- b. Turkey: 150 - 200
- c. Black Bear: 75 - 100
- d. Gray squirrel: excellent population; restricted to hardwood areas and the peripheries of gumcypress ponds.
- e. Fox squirrel: poor population
- f. Quail: fair population; restricted to clearings created by timber harvest and rights-of-way.
- g. Waterfowl: poor for migratory species; localized concentrations of wood ducks along watersheds.

Fishery resources within the Forest are primarily in Ocean Pond and, to a much lesser degree, Deep Creek. Approximately the upper one-third of Watertown Lake is within the Osceola National Forest boundary. Numerous small creeks on the Forest provide fair to good fishing for panfish. Bass fishing is confined to Ocean Pond and the Middle Prong of the St. Marys River.

Ocean Pond, which supports a fair fishery resource with a local reputation for excellent crappie fishing, is located two miles south of one potential lease site and slightly over two miles east of another permitted area.

Deep Creek and its tributaries extend approximately 25 miles within the permitted areas. While most of the feeder streams and even portions of Deep Creek itself are intermittent, they support some seasonal fishing opportunities.

Threatened Species

The Osceola National Forest provides suitable habitat for several species of wildlife presently included in "The Threatened Wildlife of the United States," commonly known as the "Red Book" (Resource Publication 114, by U.S.D.I., revised March, 1973). These threatened species are:

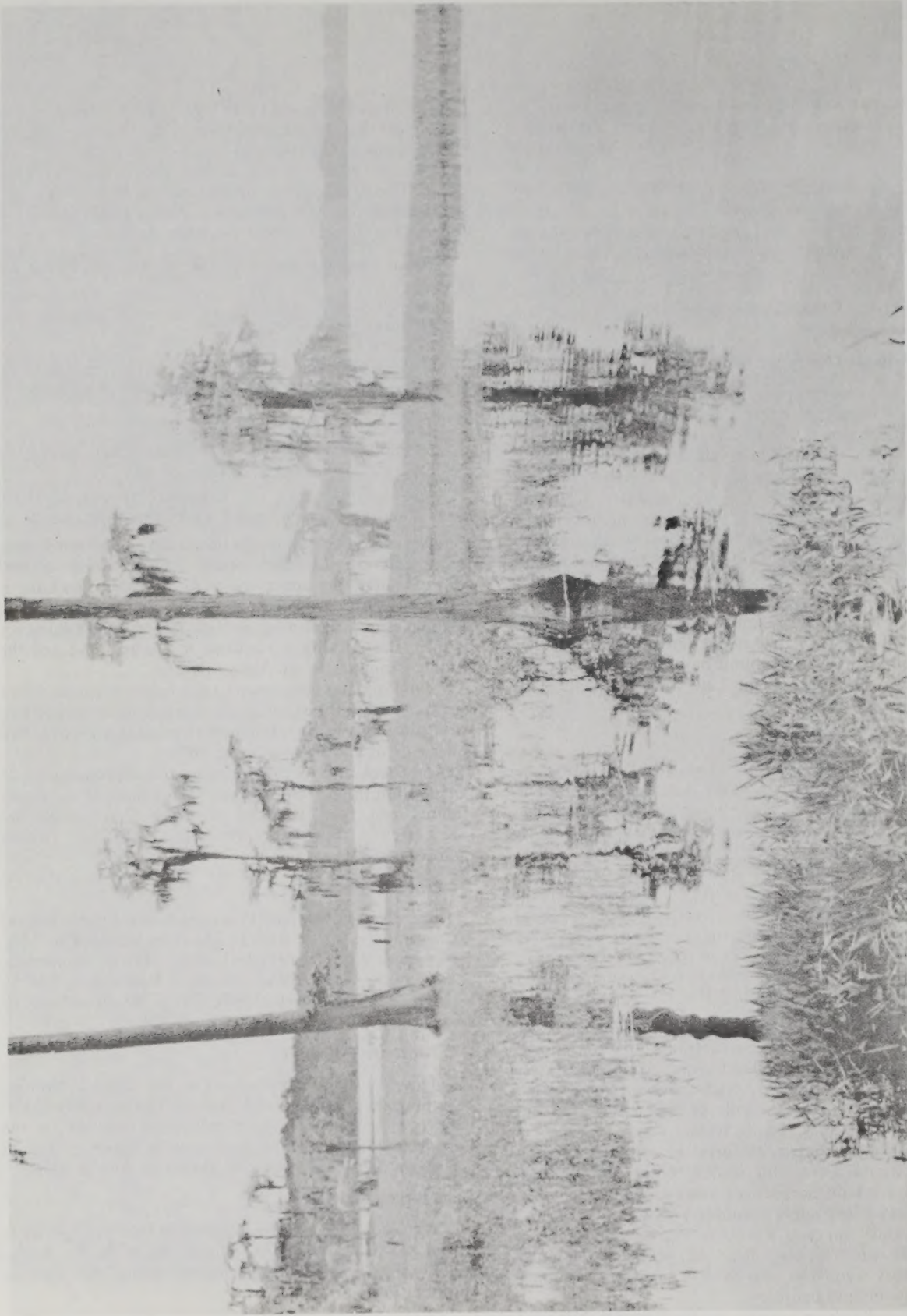
American Alligator

This reptile inhabits most of the aquatic habitats including lakes, streams, and rivers of the Osceola National Forest. Alligators were once reduced in number on the Forest, but have recently increased in numbers due to protection of habitat and protection from hide hunters.

Florida Manatee

Although it is extremely doubtful that this species is within the National Forest, it is found in the St. Marys River, which has drainage basins within the Osceola National Forest.

1/ For a complete list of wildlife, see Appendix 6.



Aquatic Community - Osceola National Forest

Florida Panther

A small population of Florida panther exists on the Osceola National Forest. Although the "Red Book" lists the Florida panther as most likely confined to the southern Florida counties of Collier, Hendry, Lee and Monroe, and Levy County in west central Florida (with "rumored" sightings in Wakulla County) there have been documented sightings of this species in the Osceola National Forest. The suitable habitat for the panther is being reduced annually.

Red-Cockaded Woodpecker

The red-cockaded woodpecker colonies are concentrated within the pine flatwoods community of the western half of the Forest. The decline in population to an estimated 50 to 75 colonies is attributed to forest management practices which removed suitable nest trees, i.e., old, living pines infected with red heart disease, from areas where colonies existed. Timber management practices on the Osceola National Forest are now coordinated with the habitat needs of this species.

Florida Sandhill Crane

The Florida sandhill crane has frequently been observed in flight over the Impassable Bay area. There are no population estimates available nor is it known whether they use the area for nesting.

Southern Bald Eagle

The Southern bald eagle may dwell within the Forest. Although the preferred range of this species is in the estuarine areas in this State, they exist in the interior section as well. Estuarine habitat in Florida is declining rapidly and if the birds are continually pressured by development, they will increasingly use the Osceola National Forest.

Suwannee Bass

This black bass occurs only in two drainages: the Suwannee River and the Ochlocknee River, Florida. The limited numbers and range of this species make it extremely vulnerable to extinction through alteration of its aquatic habitat. There is no documented evidence of their existing within the National Forest. However, they probably exist in portions of Deep Creek and Robinson Creek that are within the proposed lease area.

Arctic Peregrine Falcon

The Arctic Peregrine Falcon is an infrequent visitor during migration periods. During these times the Forest serves as a temporary feeding ground.

The Forest Service is charged with the responsibility of providing and protecting existing habitat for all threatened species within the confines of the Forest under the Endangered Species Conservation Act of 1973, Public Law 93-205. Section 7 of this Act states:

"The Secretary [of the Interior] shall review other programs administered by him and utilize such programs in furtherance of the purposes of this Act. All other Federal departments and agencies shall, in consultation with and with the assistance of the Secretary, utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species and threatened species listed pursuant to section 4 of this Act and

by taking such action necessary to insure that actions authorized, funded, or carried out by them do not jeopardize the continued existence of such endangered species and threatened species or result in the destruction or modification of habitat of such species which is determined by the Secretary, after consultation as appropriate with the affected States, to be critical."

The Act affects all mammals, fish, bird, amphibian, reptile, mollusk, crustacean, arthropod, or other invertebrate and plant species. The 1973 Act which was signed December 28, directs that plants and invertebrates be included in the updating of the Endangered Species List.

Lists which will contain provisions of the 1973 Act are in preparation. Although candidate species are not determined at this time, it is important that this environmental impact statement consider species on the Forest which may be added to the current list. Primary species which are likely to be added are those already classed as endangered by the State of Florida but which do not appear on the most recent Interior Department endangered list (Appendix 5).

In addition to the species listed on the official endangered list, the Florida Game and Fresh Water Fish Commission has enacted Rule 16 E-3 which lists species considered endangered by the State of Florida. These species are:

Florida everglade kite, southern bald eagle, Arctic peregrine falcon, Florida sandhill crane, American ivory-billed woodpecker, dusky seaside sparrow, Cape Sable sparrow, great white heron, eastern reddish egret, roseate spoonbill, wood ibis, Florida mangrove cuckoo, eastern brown pelican, Florida scrub jay, Key Largo woodrat, Florida panther, Florida round-tail muskrat, Everglades mink, Florida weasel, American crocodile, indigo snake, Okaloosa darter, pinebarren tree frog.

Of the species listed, there are three not included on the official endangered list that are known to be within the Osceola National Forest.

Indigo Snake

This species is generally found in high pine areas, usually in gopher tortoise burrows, in north and central Florida. Although there is no evidence of this species existing in gopher tortoise burrows in the Osceola National Forest, the Indigo snake has been observed in similar habitat at the south end of the Okefenokee Swamp.

Wood Ibis (or Wood Stork)

There are no known breeding colonies of this species within the Osceola National Forest, but it has been observed using the Forest as a feeding and resting ground.

Florida Weasel

According to the Florida Game and Fresh Water Fish Commission, this species probably inhabits the Osceola National Forest.

3. Forage

The Osceola National Forest provides for substantial woodland grazing use with 118,000 acres, 75 percent of the total Forest area, classified as suitable grazing land.

The forage resource consists primarily of understory vegetation within the pine flatwoods and cutover

timberlands in which tree regeneration has not yet assumed a dominant role. Principal forage species on these lands are:

Wiregrass	(<i>Muhlenbergia - expansa</i>)
Panic grass	(<i>Panicum spp.</i>)
Bluestem	(<i>Andropogon spp.</i>)
Low paspalums	(<i>Paspalum spp.</i>)
Carpetgrass	(<i>Axonopus offinis</i>)
Common Lespedeza	(<i>Lespedeza spp.</i>)
Partridge Pea	(<i>Sesbania spp.</i>)
Florida Three-Awn	(<i>Aristida spp.</i>)
Bahiagrass	(<i>Paspalum notatum</i>)
Butterfly pea	(<i>Centrosema virginianum</i>)

Nutritive value of the forage is only fair due to mineral deficiencies of the soil and both palatability and nutrient content becomes very low during the winter months. Grazing continues year long, however, and the need for seasonal supplementation of the animals' diet becomes pronounced.

Grazing capacity in terms of surface acres of suitable grazing lands required to support one animal for one month averages 8 acres per AUM over the entire forest.

However, due to the close interrelationship of understory vegetation growth to the overstory growth of trees in the pine flatwood ecosystem, grazing capacities of specific areas are somewhat transitory.

Studies at Palustris Range Experimental Station have shown that forage is greatly reduced at age five to ten years due to low closed canopy in southern pines. This condition continues for 15 to 20 years or until the canopy is high and density reduced, such as in immature and mature sawtimber stands. Balanced forage production would come with balanced timber age classes 50 to 100 years.

Timber harvest in general has beneficial effects on forage by providing opportunity for planting improved grass species during site preparation activities associated with pine regeneration.

Measures were taken several years ago to reduce permitted cattle numbers on the Forest to the grazing capacity of the land. As a result, the trend of the range condition is upward and the cattle have improved. The demand from permittees for additional cattle is greater than the supply of forage.

At present, fourteen permittees graze 1,259 head of cattle, excluding calves less than six months old, on the Osceola National Forest. Woodland grazing income is a large share of total income for eight of the permittees, and is a supplemental income for the remaining six.

National Forest lands under permit are now being grazed by cattle. The phosphate deposits are located in the following grazing allotments: Big Gum Swamp, Cowhouse Bay, Fanny Bay, Otter Bay, West Tower, and Mt. Carrie. No range improvements exist on the areas except a barbed-wire fence along the exterior Forest boundary and on either side of the right-of-way of Interstate Highway 10.

Approximately 22,400 acres of the mineable area are suitable for grazing and are supporting 2,800 Animal Unit Months or 230 head of cattle year long.

4. Timber

The Osceola National Forest contains excellent stands of southern pine sawtimber. Considering location with

respect to labor and markets, accessibility, edaphic and climatic factors, conditions are near ideal for the management and production of timber.

Of the 52,000 acres in the area proposed for lease, approximately 46,700 acres are being managed for sustained yield timber production. The remaining 5,300 acres are non-forest or marginally productive land.

The various vegetative communities in the area have been grouped into forest types for timber management purposes. The approximate acreage in each recognized forest type on the proposed lease and mineable area is:

Forest Type	Lease Acres	Mineable Acres
Longleaf Pine	16,100	8,700
Slash Pine	22,400	12,000
Slash Pine-Hardwood	3,100	1,700
Bald Cypress-Water Tupelo	3,100	1,700
Sweetgum-Tupelo-Red Maple	2,600	1,100
Unclassified (nonforest, unproductive, etc.)	5,300	2,800
TOTAL	52,000	28,000

The area in each forest type is further classified by the condition of the timber stands:

Stand Condition	Lease Acres	Mineable Acres
In process of regeneration (harvest cut made but new stand not yet established)	4,500	2,400
Seedlings and saplings (trees less than 5" dia.)	2,200	1,200
Immature poletimber (trees 5.0" to 8.9" in diameter)	20,150	11,800
Immature sawtimber (immature trees over +9.0" in diameter)	9,500	5,200
Mature sawtimber (mature trees +9.0" in diameter)	9,200	5,100
Other conditions (spars, low quality, etc.)	1,150	600
Unclassified (non-forest, unproductive, etc.)	5,300	1,700
TOTAL	52,000	28,000

The merchantable volumes of the existing timber stands on the proposed lease areas are approximately:

	Pine Types	Hardwood Types	TOTAL
Sawtimber Volume (million bd. ft.)	77.6	3.3	80.9
Pulpwood Volume (Thousand Cords)	305.4	33.8	339.2

The Osceola National Forest is in the center of the supply area for seven pulpwood mills. Five lumber and wood preservation companies utilize National Forest sawtimber.

The average annual volume cut from the permitted area is approximately 3,000,000 board feet of sawtimber, 24,000 cords of pulpwood, and 10,000 tons of pine distillate wood.

5. Recreation

The quality and type of outdoor recreation experiences are controlled primarily by the landscape and its attending components of soil, climate, relief, water, vegetation and wildlife. On the Osceola National Forest, recreation opportunities vary from swimming, boating, picnicking, and camping at developed facilities, to hunting and fishing on dispersed areas throughout the Forest.

The Forest is ideally situated to serve the outdoor forest recreation needs of metropolitan Jacksonville, a city of 550,000 only 35 miles to the east. Interstate Highways 75 and 10 intersect just west of the Forest and provide easy and fast access for many visitors from Central and North Florida. Interstate 75 provides access for 56 percent of all the tourists entering Florida. Because I-75 runs just west of the Forest and I-10 through the Forest, the Osceola is easily accessible for these tourists.

In addition to Ocean Pond and Olustee Beach, the Forest recreation resource includes: Osceola Trail, a portion of the Florida trail, which traverses about 9 miles northwest to southeast through the proposed lease area; Deep Creek, Robinson, Falling and Otter Creeks in the western half of the Forest's Big Gum Swamp in the center of the Forest; Surveyor's and Betts Eddy Bays in the northeast corner of the Forest.

Recreational visitor-day 1/ use on the entire Forest totalled over 161,500 Visitor Days (V.D.) during calendar year 1972 2/. Approximately 82,800 Visitor Days were centered around Ocean Pond at the developed facilities with the remaining being dispersed throughout the Forest 2/. Approximately 1/3 of the dispersed use occurred within the permitted area. Most of the dispersed use was hunting. It is estimated that hunting activities take place equally throughout the Forest and that hunting visitor day use in 1990 will exceed the present carrying capacity of the Forest. Dispersed use in the permitted area is estimated at 28,000 visitor days annually. The Osceola National Forest is the only major tract of publicly-owned land in northeastern Florida on which hunting is permitted. The graph on page II-43 illustrates recreation use of the Forest since 1960.

The Osceola Trail is part of the "Florida Trail" which is the only designated trail in the State of Florida and is planned to run the length of the State. The trail is expected to be 700 miles long and will be designed for non-motorized uses.

6. Land Uses and Improvements

a. Special Land Uses

The Osceola National Forest Work Center is located on about five acres in Section 22, T. 3 S., R. 17 E. It is used for the storage of vehicles and other equipment and repair parts, and serves as an assembly point for about 20 technicians and laborers engaged in managing the various resources on the Osceola National Forest such as road maintenance, recreation and clean-up area. The five acres are located within lease application BLM-A 080297.

A police target range and a sanitary landfill are operated under Forest Service Special Use Permit on lands under lease application BLM-A 080297.

The West Tower fire observation tower is in Section 7, T. 2 S., R. 18 E., on a part of the area under lease application BLM-A 079958. This tower is a secondary lookout tower used during periods of high fire danger for detection of forest fires. It is the only tower from which the western side of the Osceola National Forest is visible during periods of low visibility.

Approximately two miles of telephone line and ten miles of power line serving the needs of private lands within the Forest Service Special Use Permits are on the area under application.

A cattle corral under Forest Service Special Use Permit is located in Section 10, T. 2 S., R. 18 E., which is under lease application BLM-A 080632.

There are approximately 40 apiary sites in the permit area. The total acreage for all sites is about 15 acres, consisting mostly of quarter-acre sites scattered throughout the area.

b. Transportation System

The existing transportation system located throughout the phosphate deposit area is adequate for National Forest administration. This system consists of forest roads and trails, State and Interstate highways. The Forest Service roads within the deposit area are generally sand or clay-sand roads varying from 12 to 20 feet in width. These all-weather roads are considered essential for forest resource administration and public use. The Osceola Trail, a connecting link of the 700-mile long Florida Trail, is located through the proposed lease area. The Osceola Trail is open to the public for foot travel, that is, short scenic walks and cross-country hikes. This Trail is located in a forest environment where nature is predominate and man's works are few. Highways located in the lease area are State Secondary #250 and Interstate #10. Interstate #10 is the southern coast-to-coast highway.

c. Land Lines and Corner Monumentation

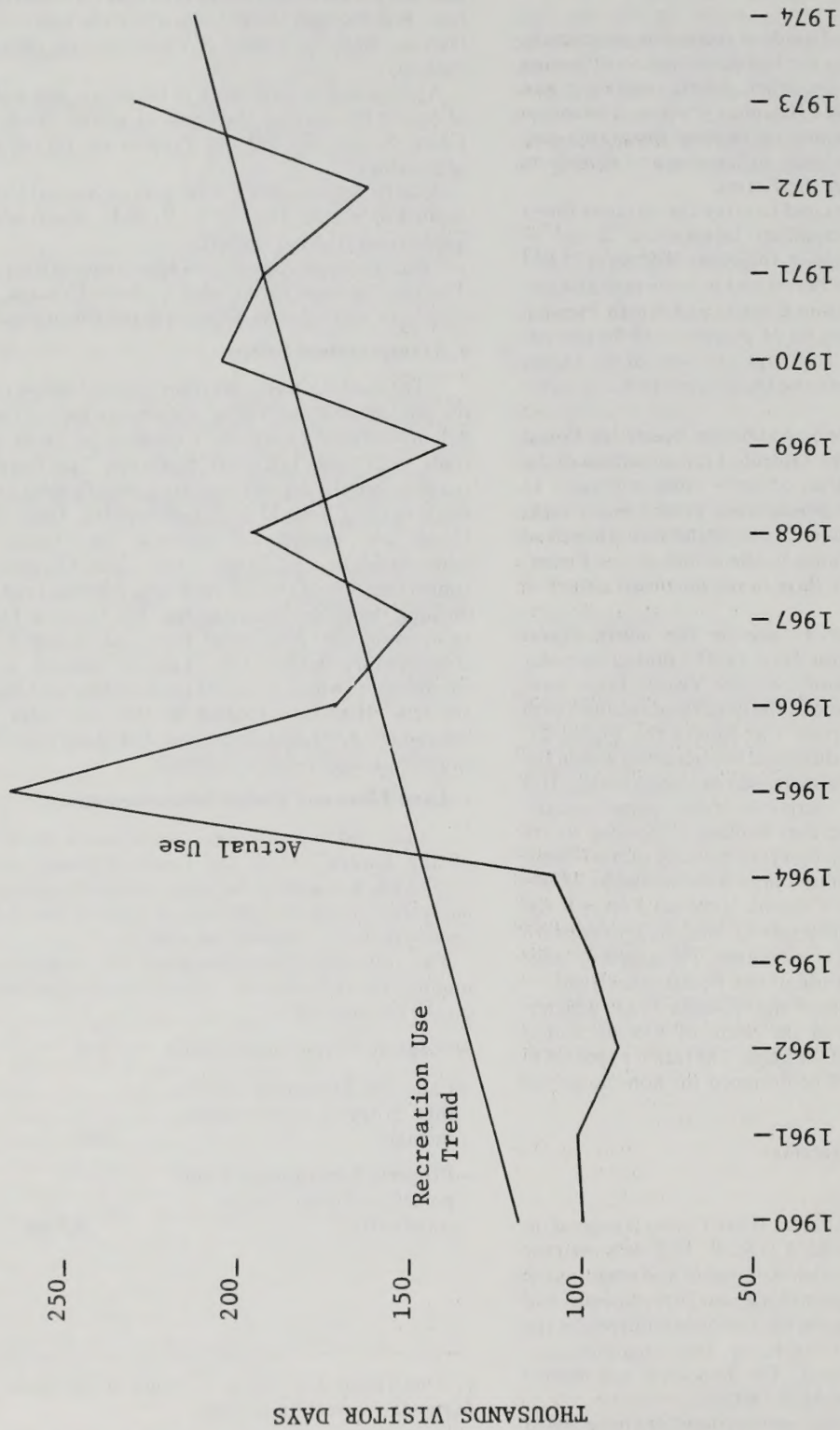
In accordance with legal requirements, the public lands of the United States are surveyed under the method employing a system of rectangular coordinate survey. The lands were originally surveyed prior to 1850 and dependent resurveys were completed in 1945.

The following tabulation gives the number of corner monuments and miles of property lines within the lease area on the Osceola NF.

--Property Corner Monuments	121
--Land Net Monuments (other than property corner monuments)	282
--Property Lines (painted and posted to Forest Service standards)	28.5 mi.

1/ One visitor-day equals 12 hours of recreation use for a particular recreation activity.

2/ Recreation Information Management, U.S. Forest Service, 1972.



RECREATION USE
OSCEOLA N.F.

7. Human Population Patterns and Considerations

a. Human Impact Region

Rule 22E of the Florida Administrative Code (approved on January 19, 1973) established 10 standard multi-county districts in Florida for coordinated planning purposes. Columbia County is a part of State Planning District Number 3 and Baker County is a part of State Planning District Number 4. Therefore, the area of impact considered in this statement is State Planning District Numbers three and four encompassing the following 18 Counties in Northeast Florida:

Region 3 - Alachua, Bradford, Columbia, Dixie, Gilchrist, Hamilton, Lafayette, Madison, Suwannee, Taylor and Union.

Region 4 - Baker, Clay, Duval, Flagler, Nassau, Putnam, St. Johns (Figure 20).

b. Regional Profile

The eighteen County region of impact encompasses 11,656 square miles of area (11,239.4 land and 416.6 inland water), approximately 1/5 of Florida's total lands area. (see Table A, Appendix 7).

Twelve and nine tenths percent of Florida's total population and 15.5 percent of Florida's rural population live in the region. Seventy-two percent of the region's inhabitants live in two populations centers: 528,865 in Jacksonville (Duval County) and 104,764 in Alachua County (in and around Gainesville and University of Florida).

ral population live in live in the region. Seventy-two percent of the region's inhabitants live in two populations centers: 528,865 in Jacksonville (Duval County) and 104,764 in Alachua County (in and around Gainesville and University of Florida).

The region's 18.7 percent rate of growth for the past decade surpasses both that of the South (15.3 percent) and the U.S. (13.3 percent) but is only approximately one-half that of the State (37.1 percent). Only two counties (Clay and Alachua) in the 18-County area exceeded the State's growth rate in the 1960-1970 period. Two Counties (Madison and Flagler) actually lost population in the same period. Surprisingly, stronger population gains were posted outside urban areas like Jacksonville (Duval County) whose 16.1 percent rate of increase was less than the region as a whole (see Table B, Appendix 7). Net immigration was a contributing factor to the rapid population growth in Alachua and Clay Counties during the 1960's.

The projected population for the region of impact in 1980 is 1,032,600, representing 17.6 percent rate of growth in the 1970's (see Table C, Appendix 7 for projected growth by Counties).

The Census of Population, 1960-1970 characterizes Northeast Florida as youthful with 74.5 percent of the population under 45 years of age compared with 63.9 percent for the State as a whole.

Education

Public schooling within the greater Impact Region is adequate. Columbia County (which would be the center of the proposed mining activity) has twelve public grade schools (including one small school for the handicapped);

one reading and materials center; one junior college (includes area vocational education center) and one private, non-profit (Catholic) grade school. State Universities are located in nearby Gainesville and Jacksonville.

Public Facilities

The Impact Region has good communication and road systems and an adequate railroad transportation system. Especially good transportation is available in the vicinity of the proposed mining area via U.S. Highway 441, Interstate 10 and direct rail access to the Jacksonville Railroad Junction.

Health facilities and manpower availability vary appreciably within the 18-County Impact Region. Flagler, with a net loss in population during the 1960's has a desirable 12.77 hospital beds for each 1,000 population and adequate active medical doctors. Whereas, Dixie County has no hospital beds or doctors and Gilchrist and Lafayette Counties have only one doctor and no hospital facilities, Columbia County (site of the proposed phosphate processing plant) however, has both hospital beds and medical doctors to accommodate reasonable population growth (see Table D, Appendix 7).

Low Regional income helps account for the relatively greater public assistance required by this Impact Region (see Table E, Appendix 7).

Electricity is the chief source of power in this Region and more costly to homeowners per 1,000 KWH than in other southern states (see Table F, Appendix 7).

The Impact Region generally lags in housing starts and existing units (except in a few areas) are inadequate in both numbers and quality (see Tables G and H, Appendix 7).

Farm and Forest Products

The Impact Region is still predominantly rural and dependent upon farm produce. In 1969, the market value of regional agricultural products sold (excluding forest products) amounted to \$143,809,000, or 12.7 percent of the State's total (see Table I, Appendix 7).

The 18-County Impact Region contains one-third of the commercial forest land in Florida - and the most productive. Production from these lands is essential to both Regional and State economies. In 1969, sales of forest products by farmers alone (in sales of \$2,500 or more) brought almost one and three quarters million dollars into the Region's economy. The 18-County Impact Region produced 52 percent of the total 3,020,675 cords of round pulpwood produced in the State in 1969. However, the State's production of round pulpwood dropped to 2,941,938 cords and the Region's production to 49.5 percent in 1970, reflecting possible losses of commercial forest lands to other uses (see Tables J and K, Appendix 7).

Employment and Income

Primary sources of employment within the 18-County Impact Region are the same as for the State of Florida: Services, Trades and Government (see Table L, Appendix 7). Of note is the Region's low (2.7 percent) unemployment rate (see Table M, Appendix 7).

Of the 18 counties comprising the Impact Region, only Duval County's per capita personal income exceeded that of the State average in 1970. Four of the eighteen counties had per capita personal incomes of less than \$2,000 and another five had per capita personal incomes of less than

\$3,000. The Impact Region's per capita personal income is substantially below that of both Florida and the United States (see Table N, Appendix 7).

The largest source of income for the 18-County Region is Government followed by Wholesale and Retail Trade and Manufacturing and Services.

C. Aesthetics

Aesthetics or beauty results from man's ability to perceive his environment. Research estimates show that man receives his impressions of the world around him as 1 percent by taste; 1½ percent by touch; 3½ percent by smell; 7 percent by hearing and 87 percent by sight.

Because of this relationship the consideration of aesthetics deals primarily with the visual resource.

The characteristic landscape 1/ of the lease area is nearly flat pine forest broken up by swamps, creeks, and bays of bottomland hardwoods and cypress. The landscape is perceived in various ways depending on the point of observation, mode of travel, and rate of movement of the observer. Directed and reflected light are used to identify or differentiate by contrast, form, line, color and texture 2/.

Climatic, topographic, edaphic (soils) and biotic (animal and vegetation) factors are seen in terms of form, line, color and texture, which in combination, make up the landscape character. Thus, the characteristic landscape of the area of the Osceola in question can be classified into soil and plant community associations whose major visual characteristics are a product of landform, aquatic and vegetative relationships. These associations occur in about the following percentages:

	Approximate Percentage
Longleaf Pine flatwoods	20
Slash Pine Flatwoods	50
Cypress Blackgum Swamp	18
Creek Swamp	12

The four associations are described as follows:

--Longleaf Pine Flatwoods - characterized by : Landform nearly level to convex ridges in the flatwoods interspersed with a few bays and swamps. Vegetation - overstory is dominated by longleaf pine with scattered slash pine common in places. Saw Palmetto is the major understory species with Runner Oak groundcover, gallberry, wiregrass, panic grasses, blueberry and bluestem also occurring.

--Slash Pine Flatwoods - characterized by: Landform - low nearly level flatwoods interspersed with many small bays and swamps. Vegetation - overstory is dominated by slash pine with scattered longleaf pine common in places; understory - Gallberry is abundant and is tall and vigorous. Saw Palmetto is common and fairly vigorous. The most common ground vegetation consists of panic grass, wiregrass, blueberry and beak rush. Wax myrtle occurs in places.

--Cypress Blackgum Swamp - characterized by: Landform-concave, wet, ponded and swamps. Vegetation - overstory is predominantly cypress and blackgum with some areas

dominated by sweet bay with scattered slash pine. Under story - greenbriar, Virginia willow, sweet pepperbush, butter bush and large gallberry. Ground vegetation is rather scarce because of flooded condition. In the drier areas, ferns, sundew, club moss, pickerel weed, rushes and sedges are common.

--Creek Swamps - characterized by: Landform - flat to slightly concave adjacent to streams. Vegetation - overstory consists predominantly of red maple, blackgum, sweet bay, slash pine, sweetgum and cypress. Understory - consists of a wide variety of shrubs including alder, Virginia willow, sweet pepperbush, button bush and greenbriar. Ground vegetation includes marsh pennywort, smartweed, arrowhead, sedges, cane, sundew, hypericum and muscadine.

This characteristic landscape contains much variety both in the individual associations and in their dispersion. Depending upon observer position, it is viewed as two major types of landscapes 1/.

Micro - small landscape: Visibility is often limited to yards or acres viewed at any one time from any one vantage point. Individual settings and scenes are usually experienced at this scale (see Photo No. 20).

Macro - large landscape: Most features can be seen at a glance from a number of vantage points. Panoramas and vistas are usually experienced at this scale (Photo No. 19).

For the area in question, the macro landscape can only be viewed from the air.

The characteristic landscape on private land adjoining the Osceola National Forest started from nearly the same soil plant community associations, but has changed due to the continuation of heavier impacts of individual private owners. Rectilinear patterns of croplands, pasture and timber harvest to ownership boundaries have been superimposed on the natural occurrence of the drier associations. In some areas this has added variety and in others, primarily along major roads, it occurs to the extent that variety 3/ is decreased.

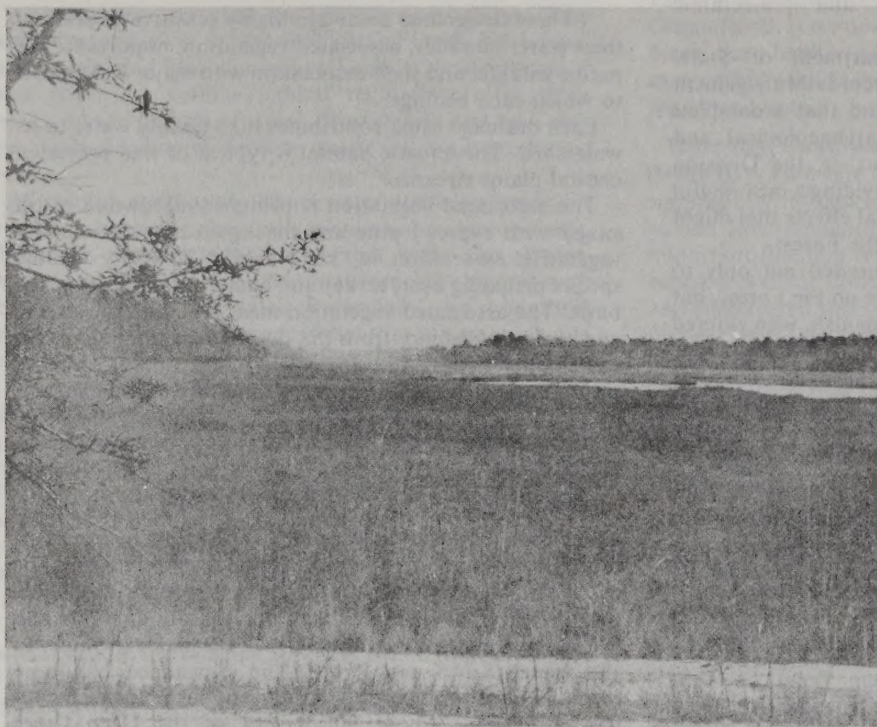
D. Historical and Archaeological Values

Historically, the Osceola National Forest has experienced four periods of development by man, namely; aboriginal, Spanish, Pre-Civil War, and contemporary. The region, particularly in the vicinity of the Suwannee River and other waterways, was inhabited by aboriginal man for thousands of years. Preliminary inventories have discovered evidence of Indian occupation within the Osceola National

1/ Page 6 and 7, National Forest Landscape Management Vol I, USDA Agriculture Handbook No. 434. U.S. Government Printing Office, Washington, D.C.

2/ Page 23, National Forest Landscape Management Vol. I, USDA Agriculture Handbook No. 434. U.S. Government Printing Office, Washington, D.C.

3/ Page 14, National Forest Landscape Management, Volume I. USDA Handbook No. 434. U.S. Government Printing Office, Washington, D.C.



A "macro" (large) landscape: *In this relatively unified landscape, similar or complementary features extend far into the distance. Most of its features can be seen at a glance from any one of a number of vantage points.*



A "micro" (small) landscape: *Here similar or complementary features may also extend far into the distance, but visibility is restricted to a matter of yards at any one time from any one vantage point.*

forest. Pre-historic sites located include village areas, habitation mounds, burial mounds and pre-ceramic campsites.

This evidence prompted the Department of State, Division of Archives, History, and Records Management for the State of Florida to recommend that a complete inventory and investigation of the archaeological and historical resources be conducted. Further, the Division states "... This is an essential step in providing a meaningful assessment of the possible environmental effects that might result. . ." from phosphate mining on the Forest.

Inventories and investigations are needed not only to establish the existence of Indian culture on the Forest, but also the possible inhabitation by the Spanish, who entered the region in 1528 in their quest for gold and to Christianize the Indians. Little evidence can be found of the missions established in the area except for some sites along the Suwannee River. One known Spanish mission in Columbia County was established in 1608 on the Ichetucknee River.

There are six known archaeological and historical sites identified within the Osceola National Forest. The location of the six sites are shown on Map 7, Section XI. Map 6 in Section XI illustrates which of the six sites are underlain by potential phosphate deposits.

Two of the six identified sites within the forest are included on the National Register of Historic Places - the Olustee Battlefield southeast of Ocean Pond on U.S. Highway 90; and the Carl Brown House, 16 miles from Glen Saint Mary. Neither of these sites is within the potential lease area. Two other identified sites lie outside the potential lease area.

The western half of the Osceola National Forest in Columbia County has no areas listed on the national Register of Historic Places. Little archaeological and historic inventory has been done in this area to date. cursory field examination has, however, identified two sites within the potential lease area. The significance and scientific value of these sites have not been determined.

E. Highly Sensitive Areas

Map No. 7 identifies specific areas throughout the forest where mining or land-disturbing activities would have greatest impact. Although the entire Forest is sensitive to mining because of the changes that can be expected in the environment, highly sensitive areas are vital to the present character and quality of the Osceola Forest. Most of these areas provide important swamp hardwood habitat for several wildlife species. Some are swamps and drainage ways which affect major drainages miles away. Others are important because of their archaeological or historical significance. The reason for the sensitivity is defined for each area. Several of these areas are partly within the proposed lease area and the descriptions give the percentage of each area that could be affected by mining. These areas may be grouped into three broad categories --

- Creek and River Drainages
- Swamps and Bays
- Other Areas

Creek and River Drainages

These designated areas are highly sensitive because of their water qualities, associated vegetation, importance for native wildlife, and their association with major watersheds to which each belongs.

Each drainage listed contributes high quality water to its watershed. The aquatic habitat is typical of well protected coastal plains streams.

The associated vegetation is primarily hardwood brush mixed with cypress, pine and blackgum overstories. This vegetative association is "key" habitat to many wildlife species including bear, turkey and numerous small nongame birds. The associated vegetation meanders with the stream and varies in distance from the stream depending upon the soil characteristics. All listed creeks and drainages meander through the Osceola "Flatwoods" and provide a change or diversity to the total land use.

The following are descriptions of specific areas within this group. These areas are:

Deep Creek drains from northwest portion of the Forest and flows into the Suwannee river. Its many miles of drainage ways are very important for several reasons. The associated bottomlands and hardwood swamps are highly productive wildlife habitat and serve as floodplains and filters for surface waters. Deep Creek is a major tributary to the upper Suwannee River. The Suwannee has been recommended for inclusion to the National Wild and Scenic Rivers System. About 90 percent of the Deep Creek watershed is within the lease area.

Robinson Creek drains from the west central portion of the Forest. It heads up and flows from the northern portion of Otter Bay and is a tributary to the Suwannee River. Just as Deep Creek, it is important because of its hardwoods and bottomland characteristics. About 75 percent of its watershed is within the permit area.

Falling Creek has an extensive drainage area and flows south and north, then west from the Forest into the Suwannee River. It drains most of the southwestern portion of the Forest and about 50 percent of its watershed is within the proposed lease area. Variety provided by the associated hardwoods in the Falling Creek is very important for wildlife habitat. Falling Creek is captured by a sinkhole a few miles west of the Forest where its flow enters the underground aquifer.

Middle Prong of St. Marys River is made up of many small tributaries and is fed primarily by waters coming from Big Gum Swamp. The Middle Prong flows from the northeast portion of the Forest and is a major tributary to the St. Marys River. The St. Marys River originates in the Okefenokee Swamp and empties into the Atlantic Ocean northeast of the Forest. All of the Middle Prong's many drainages and tributaries, with their associated hardwood swamps are productive from a wildlife standpoint and serve as floodplains and filters for surface water. About 10 percent of the watershed is within the permit area.

Swamps and Bays

These areas are vital for wildlife and habitat. They provide escape cover for species like the Florida black bear, turkey, deer, and Florida panther. Large, unbroken areas of thick cover are definite habitat requirements for these species during periods of stress. The swamps and bays also are highly productive browse, mast and fruit producing areas.

All swamps and bays listed are water holding or reservoir areas for one of the previously mentioned creeks or rivers. These are the common thread that links the system. Deleterious activities that occur in these areas obviously will be passed on to associated watersheds. An important function of these swamp areas is that they serve as recharge areas for the Floridan Aquifer.

The swamps and bays provide a diversity in the general flatwoods habitat that is beneficial if not required for the present wildlife species composition. The change in plant composition, the water levels, plant density and abundance of suitable nesting areas (trees, logs, etc.) are very important to many non-game and game animals.

The landscape character of the Osceola National Forest is enhanced by the swamps and bays. The contrasting colors, textures and species are noticed by all Forest visitors.

The Florida black bears live within the Osceola National Forest because the swamps and bays are an important part of their habitat. These areas provide suitable escape habitat which is so necessary for black bear existence.

The following are descriptions of specific swamps and bays:

Impassable Bay can be described as a southern extension of the Okefenokee Swamp or as a part of a network of swamps which covers a large area of south Georgia and northeast Florida. This remote and wild area serves as a reservoir for waters for both Deep Creek and the Middle Prong of St. Marys River or St. Marys River itself. This vast expanse of swampland also provides suitable habitat for the endangered and threatened Florida panther and alligator. This type of habitat is considered critical for the Florida black bear whose numbers are very limited.

Big Gum Swamp is the largest swamp entirely within the Osceola National Forest. It also is very important from a standpoint of wildlife habitat for game and endangered and threatened species. Big Gum Swamp has long been known as a refuge or a stronghold for the Florida black bear because of its inaccessible nature. Like Impassable Bay, it also serves as a reservoir and water regulator for the Middle Prong of the St. Marys River and functions as a recharge area for the Florida Aquifer. Big Gum Swamp has been suggested by conservation organizations and the State of Florida for inclusion as a study area in proposed Federal Wilderness legislation. The southern one-third of this Swamp is within the permit area.

This area also contains a 373 acre classified Natural Area designated in 1936 for research purposes to perpetuate natural stands of virgin forest including pond cypress, slash pine, pond pine, longleaf pine, and mixed hardwoods.

Fanny Bay is a sensitive area because it contains an unusual virgin stand of large bald cypress. Virgin bald cypress stands are scarce because most cypress bays in Florida have been logged. Fanny Bay is not within the permit area.

Little Gum Swamp is located just northwest of Ocean Pond and receives and regulates the overflow waters from Ocean Pond. It is important both as a prime area for Florida black bear habitat as well as providing escape cover for many other wildlife species. Little Gum Swamp is not within the permit area.

Otter Bay, Cowhouse Bay, Surveyors and Betts Eddy Bay, Ocean Bay. These are large swamp and hardwood areas that significantly influence water storage, aquifer recharge and stream flow regulation on the Forest. They also serve an important function for wildlife by providing large areas of escape cover for both game, non-game, threatened species and endangered species. They provide a diversity of habitat on the Forest that is not only necessary for the animals but is pleasing for the Forest visitor. About 30 percent of Otter Bay and all of the Forest's portion of Cowhouse Bay is within the lease area. Surveyors and Betts Eddy Bay and Ocean Bay are not within the permit area.

Other Areas

The following are descriptions of other areas:

Ocean Pond contains 1,750 acres and the areas surrounding have direct influence on its water quality and aesthetics. These areas maintain and protect the water and recreation qualities of Ocean Pond. Ocean Pond is a key area on the Forest because of its recreational opportunities including fishing, camping, picnicking, swimming and boating. The area contains a major campground, a newly developed day use area and two summer home areas. Ocean Pond is not within the permit area.

Olustee Experimental Forest. There has been considerable time (based upon tree life-cycles in the magnitude of scores of years) and money invested in research plots on the Olustee Experimental Forest. This Experimental Forest is not within the permit area.

1. The first part of the paper discusses the importance of the research and the objectives of the study. It highlights the need for a comprehensive understanding of the subject matter and the role of the researcher in this process.

2. The second part of the paper provides a detailed overview of the methodology used in the study. It describes the data collection methods, the sample size, and the statistical techniques employed to analyze the data.

3. The third part of the paper presents the results of the study. It includes a series of tables and figures that illustrate the findings of the research. The results are discussed in the context of the research objectives and the existing literature.

4. The fourth part of the paper discusses the implications of the study. It explores the potential applications of the findings and the limitations of the study. It also provides suggestions for future research in this area.

5. The final part of the paper is a conclusion that summarizes the main findings of the study and reiterates the importance of the research. It also includes a list of references that provide a comprehensive overview of the literature related to the study.

The first part of the paper discusses the importance of the research and the objectives of the study. It highlights the need for a comprehensive understanding of the subject matter and the role of the researcher in this process.

The second part of the paper provides a detailed overview of the methodology used in the study. It describes the data collection methods, the sample size, and the statistical techniques employed to analyze the data.

The third part of the paper presents the results of the study. It includes a series of tables and figures that illustrate the findings of the research. The results are discussed in the context of the research objectives and the existing literature.

The fourth part of the paper discusses the implications of the study. It explores the potential applications of the findings and the limitations of the study. It also provides suggestions for future research in this area.

The final part of the paper is a conclusion that summarizes the main findings of the study and reiterates the importance of the research. It also includes a list of references that provide a comprehensive overview of the literature related to the study.

III. ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION

This section discusses impacts in the unmitigated or worst case condition.

Ecological Interrelationships

Some of the interrelationships in the cycles and flows that link the components of the ecosystem are not known or understood. It is assumed the impacts on one part of the ecosystem will affect the whole; however, the manner and magnitude in which the total ecosystem is affected is only partially known.

The results of studies pertaining to soil, topography, climate, vegetation and the design of and the method of mining must be interpreted with respect to the specific conditions that characterize the impacted area. Removal of the producing components of the ecosystem would cause interruption of the food chain and loss of habitat for many members of the biotic community. This could result in temporary, long-term or permanent disruption of the forest ecosystem. Resulting reductions in population densities of the living community components, due to mortality or relocation, may in some instances be temporary. Nevertheless, the ecological interrelationships of the impacted area and adjacent areas are disrupted. Ecological interrelationships of the impacted area and adjacent areas are disrupted. Ecological interrelationships in adjacent undisturbed areas are in delicate balance, therefore, translocation of animals, human activities, physical improvements, water flows and air or water pollution may constitute secondary impacts which further extend the effects of the action. The severity of the short-term impact is not always localized to the directly affected area, but is dependent on the ability of adjacent areas to absorb secondary impacts. While the physical impact of mining practices on vegetation are readily visible, impacts on the micro-organisms in the soil are more subtle and often indiscernible. Micro-organisms constitute a vital link in the trophic hierarchy, and their elimination or reduction due to soil disturbance practices can also result in significant short-term impacts on the ecosystem.

The long-term impact of mining on an ecosystem is primarily dependent upon its rate of recovery and varies with the ecosystem's physical and biotic characteristics. Generally, communities with high productivity in terms of the vegetal biomass recover rapidly. Communities with low productivity, i.e., plants with low growth rates and animals with low reproduction rates, are generally fragile and slow to recover. Consequently, the long-term impacts of the development, harvest, and transportation practices that destroy vegetation and/or cause extensive surface disturbance can be particularly severe.

Phosphate mining operations are presently underway west of the forest boundary. If all the phosphate deposits outside of the forest are mined, the cumulative impacts on the local hydrology, air and water qualities, wildlife and fisheries habitats could be greater than those described for the action under consideration. The impacts caused by phosphate mining outside of the forest could accentuate the values of the existing National Forest environment, or be so disruptive as to negate the impacts described for the action under consideration.

A. Non-Living Components

1. Geology

Extraction and removal of the matrix from the Osceola National Forest would change the surface geology and mineralogy. This change would be one of quantity, content and distribution rather than interaction with the existing undisturbed formations. This change would occur regardless of how the overburden might be reshaped following mining.

Stripping of the overburden in the course of mining on the Osceola would change the order of the strata of the overburden. Some phosphate occurring near the bottom of the overburden would be placed at, or near, the new land surface. Because the top of the matrix is uneven, stripping of overburden by dragline would scrape off some matrix. This too, could be placed at or near the new land surface. Although natural phosphate is relatively insoluble, it would gradually dissolve.

The total effect of matrix removal and landfilling to pre-mining topography with the remaining overburden, would create pits over approximately 1/3 of the mined area. These pits would create lakes and ponds. The source would be from ground water.

Processing of the Osceola matrix on the adjoining private lands would add to the volume, not the nature, of geologic and mineralogic changes that would take place on the private lands.

Processing will separate the matrix into three components. The first component (about one-third of the matrix) will be marketable phosphate. The second component (about one-fifth of the matrix) will consist of colloidal material (slimes) which would be disposed of in mined-out areas on the private lands. Slimes are stored in a manner higher than the original land surface. Both slimes and the phosphate matrix contain approximately the same concentration of radium 226 (44-48 curies per 10-12 grams). 1/ However, the matrix is "shielded" by the overburden whereas, slimes are exposed to the atmosphere thus increasing radioactivity at the surface.

If sand tailings are not added to the slimes to hasten drying, the slimes will consist of fine sand, along with minor amounts of uranium in the phosphate fraction.

A third component (almost one-half of the matrix) consists of sand tailings and a trace of phosphate, feldspar and heavy minerals.

Gypsum is a by-product mineral created by the acidulation of phosphate rock with sulphuric acid and may be stockpiled dry, or disposed of as landfill.

2. Mineral Resources

The above changes on the Osceola National Forest or on the adjoining private lands are not expected to interfere with the eventual recovery of other minerals should they be discovered.

1/ Environmental Protection Agency National Field Investigations Center - Denver Reconnaissance Study, Radiochemical Pollution from Phosphate Rock Mining and Milling, December 1973.

3. Soils

Developmental Drilling

During developmental drilling, compaction and soil disturbance from drilling equipment will take place. The drill holes will penetrate firm or brittle organic layers and dense clay layers in the subsoil causing some downward drainage through drill holes.

Mining

In surface mining, the natural soil horizons would be destroyed and soil texture, consistency, structure, plant nutrient levels, soil reaction, and moisture regimes would be changed. The overburden surface would be more compact and more erosive due to steeper slopes and removal of the present root mat.

Soil micro-organisms and mycorrhiza would be disrupted during surface mining operations, resulting in a short-term and possible long-term impact on tree growth and the ecosystem. Micro-organisms are important decomposers of forest litter and release nutrients to be recycled by living plants. Mycorrhiza fungi associations occurring naturally with woody plants are important to plant nutrition. 1/

Drag lines displace the earth in such a manner that the organic matter and most of the soil nutrients in the surface layers would be buried and lost to plant growth and subjected to leaching into the groundwater. This would increase the nutrient content of groundwater and would affect the receiving streams. Some of the matrix, rich in rock phosphate, would be unavoidably mixed with the overburden and left on the site, increasing the phosphate level of the disturbed soils in some places. This phosphate would be in the raw rock form which is not water soluble or readily available to plants. In many places the strongly acid subsoils have high concentrations of iron and aluminum that can combine with water-soluble forms of phosphate and form insoluble compounds of iron and aluminum phosphates which render the phosphate mostly unavailable for plant growth. Hence, some reclaimed soils could have higher content of available calcium and magnesium as well as phosphate than the existing natural soils on the forest. These changes in soil chemistry could influence types and rates of vegetative succession.

The hydrologic characteristics of the disturbed soil materials would be different from the natural soil because of altered physical characteristics. Permeability would be increased initially by the breaking up of slowly permeable layers now existing.

Erosion and Sedimentation

Changes in land form and the exposure of sandy clay loam materials associated with the construction of dikes and other disturbances caused by the mining operations, create a potential for increased sheet erosion and sedimentation. The primary erosion hazard would exist on the periphery of the disturbed area where drainage could escape dikes, ditches and sediment basins.

Soil characteristics that influence erodibility by water area: (1) those that affect infiltration rate, movement of water through the soil, and water storage capacity; and (2) those that resist dispersion, splashing, abrasion, and transporting forces from rainfall and runoff. Some of the properties that are most important are texture and organic

matter of the surface layer, size and stability of structural aggregates in the surface layer, permeability of the subsoil, and depth to slowly permeable layers.

The Modified Musgrave Equation is commonly used to calculate sheet erosion losses in forested areas. Background development of each factor in the equation is defined in the S.C.S. Guide to Sediment Investigations. 2/ Calculations using the Musgrave Equation indicates erosion for the flatwoods on the Osceola National Forest at .01 tons per acre per year.

Most of the overburden would be within the mined-out area where erosion would be mostly confined to pits and not subject to entering streams. Some of the overburden is used for making dikes and the outer banks of these would be subject to erosion and off-site sedimentation.

The potential sheet erosion, is calculated as 111 tons per acre per year. Assuming that about 3 miles of dikes on the periphery of the mine area would be constructed each year, it is estimated that 30 acres of outer banks of these dikes could be exposed to potential erosion before vegetative cover can be established.

The sheet erosion figures do not relate to sedimentation in streams, since most of the eroded material never reach a stream. Overburden materials can erode at a rate of 111 tons per acre per year, however, only about half of this erosion product leaves the immediate site. An estimated 55 tons per acre per year from 30 acres for a total of 1,650 tons, of sediment could enter streams in the area each year.

Flooding and Sedimentation

A portion of the mineable area, on and off the Forest, is within the one hundred year flood-prone area of the Suwannee River. Flood waters from the Suwannee could inundate and erode the dikes and create spillage of sediment and slime pond materials into the flood waters, thereby polluting the Suwannee River.

Ore Processing

The ore processing operation separates the phosphorus bearing compounds from the sand and clay and the tailings are separated from the clays and deposited in piles. The sand is very low in organic matter, generally low in plant nutrients and difficult to revegetate. The clay generally is stored in slime ponds in a colloidal condition. Clays in the slime ponds are of the expanding type (montmorillonite) that undergo wide volume changes with wetting and drying. Therefore, slime ponds are unsuitable and unstable for building foundations unless reclaimed with sand tailings and overburden. Even then, these sand-laden areas could be unstable.

It is estimated that 45 acres of private land would be required for processing facilities (beneficiation plant). Slime ponds would occupy 10,000 to 12,000 additional acres to accommodate slimes from National Forest lands, thereby

1/ Pritchett, W.L. and W.H. Smith. 1968 Tree Growth and Forest Soils. Proc. of the 3rd North Amer. Forest Soils Conf. North Carolina State University at Raleigh, Corvallis: Oregon State University Press, p. 19-41.

2/ Guide to Sediment Investigations. 1968 U.S.D.A. Soil Conservation Service. South Region Technical Center, Fort Worth, Texas.

nullifying soil productivity for up to 30 years. Soil compaction would occur during clearing and construction activities, both on-site and off-site, along utility corridors, slurry pipelines and roads.

Fertilizer Manufacture

Airborne sulfur compound particles falling on the soil could increase the acid and the available sulphur content of the soil. Phosphorus and nitrogen compounds that reach the soil would increase its fertility. However, the appreciable effects of fertilizer processing on the soil would occur within a small area near the plant. Although wind would carry some particles long distances before fallout occurs, this would tend to scatter the particles and dilute the effects. Airborne fluorides deposited through precipitation could be a pollution problem (see air quality section).

It is technically feasible to remove uranium from phosphate during the fertilizer manufacturing process. However, radium 226 and radon 222 are left as a by-product in the gypsum.

After Mining

Soil sampling, testing, and studies would be prerequisite to a successful reclamation program. However, it can be expected the productivity of the reclaimed materials could be less than the natural soil for timber productions because of the dispersal of the organic matter and loss of other natural soil characteristics. Reclaimed soil materials, because of higher clay content, could have a higher available moisture capacity for plant growth than the existing soil. These conditions would favor increased forage production.

With the passage of time, a clay enriched layer within the soil profile would be formed by translocation causing a reduced percolation rate. Infiltration of rain water would be slow because the surface of the reclaimed materials would consist of a mass of structureless material high in clay content.

Because of the changes to the soil and land, precise fertility levels and productivity potentials of the overburden cannot be determined until it is shaped and then analyzed. Soil reaction of reclaimed areas in Central Florida ranges from a pH 4.3 to 6.5. Nutrient levels also vary considerably. Soil analysis of mined areas in North Florida indicate that reclaimed land can have higher levels of phosphate, calcium and magnesium than the existing soils. However, the soils contained little organic matter and had impaired physical properties resulting mainly from the loss of structure and changes in texture, consistency and bulk density.

Florida's phosphate industry has experienced success in reclamation and revegetation of mined areas. Pasture grasses and legumes planted include Bahia grass, Aeschynomene, hairy indigo, brown top millet, ryegrass, signalgrass, and others. Other revegetative species are peanuts, citrus trees, slash and sand pine. Natural revegetative processes will need support on mined sites.

Based on observations in Central Florida, pine reforestation on overburden appears feasible, however, survival and growth rates are largely unknown. Also, reforestation has been accomplished on a relatively small scale compared to the proposed lease area on the National Forest. Other difficulties in comparing pine plantations on overburden in Central Florida with what can be expected on the Osceola Forest are the differences in soils and climate.

Most soils mined in Central Florida are of the Gainesville, Arrendondo, Fort Meade and Myakka series. Generally, these soils have higher nutrient levels and are more productive than the poorly drained soils in the proposed lease area. Central Florida is in a warm soil and climatic temperature zone which supports different vegetative associations than those in the vicinity of Osceola National Forest.

Water table levels of the reshaped materials would depend on the final grade and settling that would occur for several years after mining. It is possible that some of the reclaimed area would be higher above water table levels than existing soils and therefore drier. Conversely, through settling, some of the area could become wetter than desired. These unknown possibilities handicap predictions of capabilities needed for land use decisions within the area after mining.

4. Water Resources

a. Watershed

Developmental drilling would not affect local hydrologic watershed conditions. A small amount of equipment and few people would be on site at any time.

There would be a minor effect on the nonartesian (water table) aquifer, because water is either not used (brought onto site) or is recycled in this operation (depending upon the type of drilling). Temporary disturbance would occur when drillholes bisect zones of different transmissivity (organic layers and dense layers of sands and sandy clay loam) until the holes are backfilled.

The Suwannee River watershed would be affected by the mining operation (see following table). Approximately 34 percent of the total National Forest watershed area tributary to the Suwannee eventually would be mined. About 5 percent of the Middle Prong of the St. Mary's River drainage would be disturbed. No disturbance would occur on the Olustee Creek and Cedar Creek subwatersheds.

Many individual phosphate deposits extend across boundaries of adjacent watersheds.

The mining operations would bisect several streams resulting in altered drainage characteristics. Approximately 31.5 miles of streams on National Forest land would be bisected, causing interruptions and diversions of the normal, orderly streamflow.

Similar impacts would occur on streams on private land.

There would be no impacts on the watersheds in the National Forest itself by ore processing because the beneficiation plant and slime pits would not be tributary by either surface or subsurface flow to the forest land. There would be impacts on the private lands in the vicinity of the dikes, ponds and water diversions necessary to recycle water through the slime pits and washing and chemical plants if they are constructed. Streamflow and drainage patterns would be changed especially if the ponds bisected streams.

During the production of chemical fertilizer, by-product particles may be transported to watercourses. This possibility is dependent upon the location of the chemical plant, prevailing wind direction and velocities. The total effect on the surrounding area would be small because of particle dispersion.

Streamflows, especially offsite, normally would have higher concentration of by-product chemicals because of the "flushing" of the watershed. Static or ponded water areas

Watershed Area Affected by Phosphate Mining

Osceola National Forest				
Watershed	Acres Watershed Area	Acres Phosphate Deposits	% Watershed Affected by Mining	Miles of bisected Streams
Deep Creek	47,600	16,700	35.1	22.6
Robinson Creek	9,000	2,925	32.5	3.3
Falling Creek	14,000	4,450	31.8	5.6
Middle Prong St. Mary	80,600	4,725	5.9	--
Total	151,200	28,800	--	31.5
	1/	2/		

NOTE: Of the 70,600 acre National Forest Watershed area tributary to the Suwannee River (Deep Creek, Robinson Creek, Falling Creek), the total percentage watershed area affected by mining (24,075 acres) is $(24,075/70,600) \times 100 = 34.1$ percent.

1/ No phosphate deposits occur in the Olustee Creek and Cedar Creek watersheds.

2/ Includes those private land holdings within the Forest Service boundary having phosphate deposits.

would increase slightly in total phosphate and nitrogen because of the lack of "flushing."

b. Hydrology

Developmental drilling would not affect surface hydrology.

During the mining operation, streamflows would be affected. It is assumed that 750-1000 acres would be denuded of vegetation at all times. Removal of this vegetation will increase potential surface runoff because of the additional water available which ordinarily would be "lost" by evapotranspiration. It is estimated that approximately 2250 acre feet per year of streamflow (750 ac. x 3 ft.) of evapotranspiration 1/ will be added. This additional water, coupled with reduced infiltration rates due to the crusting of exposed soil by rainfall could cause increased surface runoff. This runoff would increase the potential for erosion, sediment transport and deposition to downstream areas. This would become critical when the runoff is routed offsite to downstream areas through man-made drainage channels.

The change in the hydrology due to the mining operation and the unpredictability of stormflow drainage might cause inundation of previously nonflooded areas. This would create a safety problem for Forest visitors and private landowners within and outside the National Forest boundary.

New and unstable outflow channels would occur as a result of mining and would increase erosion and sedimentation. Soil moisture storage and adjacent water tables would be altered by new channels and their eventual downcutting.

Interwatershed transfers of water within the nonartesian aquifer would occur after those phosphate deposits which extended across the watershed boundaries have been replaced by overburden which has a higher initial transmissivity. This interwatershed transfer would also occur with surface runoff and such transfers would alter the flood flow net.

Production of chemical fertilizer would not affect surface hydrology.

Reclamation would affect surface runoff if additional streams are bisected or channelized.

c. Water Quality and Water Usage

The removal of vegetative cover during the mining operation increases water temperatures due to increased sunlight reaching water surface. During storm periods the large amount of exposed soil would increase the potential for soil nutrients to enter streamcourses by erosional processes.

Eutrophication could occur in slow moving water bodies. Decreased levels of dissolved oxygen, higher temperatures, and greater biochemical oxygen demand levels would occur. Algal blooms and encroachment of water hyacinth and weeds would occur. During the mining operation, the fish habitat would remain degraded until complete restoration of the fishery waters.

Slime pit dams in conjunction with ore processing pose a threat of pollution, sedimentation, and flooding in downstream areas should a break occur.

On March 11, 1967, an earthen dike near the Peace River in central Florida burst, releasing between 1000 and 1500 acre-feet of "slime" into the river. Nearly all aquatic life in a 76-mile stretch to the river's mouth succumbed. 2/ In August 1967, an agreement was reached by which a pollution settlement of \$200,000 was paid by the phosphate mine owners to the State Board of Health and the Florida Game and Fresh Water Fish Commission. This settlement was to cover expenses incurred in tracing the pollution, in assessing losses due the State of Florida and for restoration of the river. Active spawning of sport fish in the polluted section of the river was first noted thirteen months after the kill.

1/ Personal communication with U.S.G.S. hydrologists.

2/ Peace River Study: Pollution Investigation - Mobil Incident, Florida Game and Fresh Water Fish Commission, February 11, 1969.

Another major spill occurred on December 3, 1971, which caused a fish kill extending for 74 miles in Whidden Creek-Peace River. 1/ Excessive turbidity from the slime existed in the intertidal section of the river until the advent of Hurricane Agnes in June of 1972. Maximum deposition of the slime-sediment in the stream bottom was 3 feet in depth. The estimated kill was 3,172,010 fishes valued at \$704,775.14. An additional \$200,375 was needed for stream restoration prior to restocking. Additional costs and damages are indicated in the report, and it further states that subsequent to January 1960, at least five major fish kills have occurred on the Peace River. These fish kills were a "result of inadequate, careless, or negligent phosphate mining operations."

The Miami Herald on December 3, 1973, reports that the Cities Service spill, "was the fourth spill in a decade, the 30th since 1942, and each has taken an increasing toll on a river that could never recover."

The probability of a dam break occurring is difficult to predict. Prior data on the history of events leading up to a break such as climatic conditions, maintenance inspections, equipment conditions, etc. are sketchy and incomplete. The exact causes of the breaks are not always known or documented and many small breaks are not usually known or reported unless they receive press coverage, become enforcement actions or court cases. 2/

New legislation now requires specific construction methods, inspections, reports, etc. for earthen dams in phosphate operations. 3/ These "rules" not only apply to new dams, but also to old and abandoned dams. Dams in northern Florida are usually 20 feet high as compared to 30-40 feet high in the central Florida phosphate areas. Small safety ditches usually surround the dams.

Thus, past history records vs. changes in legislation make it very difficult to predict the probability of future breaks. There is no record of slime spills from the phosphate operations in Hamilton County, although there have been some minor releases of material which caused high turbidities in the receiving waters. 4/

The byproduct wastewaters from the production of chemical fertilizers would pollute surface waters (see previous discussion of environment). The degree of pollution would depend upon the production capacity, waste outputs and waste treatment measures.

Radium emissions result primarily from uranium decay products, radium 226 and radon 222. From the standpoint of water pollution, the radioisotope, radium 226, is the most hazardous. An Environmental Protection Agency Reconnaissance Study along with a U.S. Public Health Service (PHS) report indicates that radium concentrations in shallow wells throughout much of Polk County (Central Florida) were greatly in excess of the PHS drinking water standard of 3 curies per 10-12 liters of water (1 liter = 0.2642 gallons). 5/ These concentrations were primarily due to the seepage of radioactive gypsum pond water into the ground water. The EPA study further states that "no towns are known to use water exceeding the PHS maximum standards, although several supplies approach the limiting value." 5/

Further, it is not expected that ground water contamination from this source will be as serious in north Florida since the potentiometric surface is lower and underlying geologic materials are such that seepage will not readily occur.

In addition, there are few planned releases of gypsum pond water to surface streams. When discharges are necessary, the gypsum pond water is limed which reduces radium concentrations. The EPA report indicates that the single-liming process will reduce the radium 226 contamination levels from 65 to 7.6 curies per 10-12 liters of water. 5/ The commonly practiced double-liming process will decrease concentrations to within PHS safe standards for drinking water (3 curies per 10-12 liters of water).

Little information is available relative to radon 222 emissions. Further study of both radium 226 and radon 222 contaminations is being conducted by the EPA.

Reclamation activities could temporarily increase sedimentation to the streamcourses due to additional disturbance of soil and instability of new slopes and channels.

d. Ground Water Hydrology

Developmental drilling would cause short-term impacts on the ground water primarily in the nonartesian and secondary artesian aquifers. Some vertical transfers of water could be expected between these aquifers and the surface depending upon the level of the potentiometric surface. No impacts are expected to occur since this operation is completed just prior to mining.

Pits as large as 400 feet wide, one mile long and 30 to 40 feet deep would be constructed for mining operations. This could create major impacts of long term duration. Tailing storage areas and slime ponds would be constructed near the plant site to minimize transportation of wastes. Mining would require 135,000 gallons of water per minute (24 hours/day - 7 days/week) of which about 90 percent would be recovered and recycled. Dewatering the shallow aquifer would be required during mining operations. Consumptive use of water would be about 13,500 gallons per minute. This make-up water would probably be supplied by deep wells located off the Forest and used mainly in the production of fertilizers and chemicals.

Mining pits would intersect the shallow aquifer and possibly the secondary artesian aquifer. The pits might intersect sinkholes or other karst features open to the Floridan aquifer. A series of pumped dewatering wells would probably be required on the perimeters of the pits in addition to pumps in the pits to divert an undetermined quantity of water. The dewatering must lower the water level in the pits and in the surrounding area to at least 30 feet (bottom of the pit) below land surface.

1/ Peace River and Whidden Creek Study: Pollution Investigation - Cities Service Company Incident; Florida Game and Fresh Water Fish Commission, December 3, 1971.

2/ Personal Communication, Florida Department of Pollution Control.

3/ See Appendix 9.

4/ Personal Communication, Florida Game and Fresh Water Fish Commission.

5/ Environmental Protection Agency National Field Investigations Center - Denver Reconnaissance Study, Radiochemical Pollution from Phosphate Rock Mining and Milling, December, 1973.

Dewatering would reduce the quantity of ground water in the shallow aquifer and possibly in the secondary artesian aquifer. Dewatering of the shallow aquifer possibly would reduce the base flow of some streams in the area but might increase the flow of other streams which receive the discharge of the pumped water.

Throughout most of the area, the natural water table of the shallow aquifer is higher than the potentiometric surface of the Floridan aquifer and it recharges the Floridan aquifer by downward leakage through the underlying confining beds. Depression of the shallow aquifer by dewatering would reduce recharge to the Floridan aquifer. If the water table is depressed below the potentiometric surface, the direction of intermovement of water between the aquifers would be reversed, and water from the underlying Floridan aquifer would tend to move upward into the shallow aquifer and possibly into the mining pits. This would tend to deplete the Floridan aquifer.

Construction of mining pits across watercourses would cause diversion of streams. Overburden material piled near pits would be subject to erosion and could wash into surface streams during floods or wet periods. The piled overburden might fill in wet areas and prevent natural ground water infiltration in the locality. Pits constructed in flood prone areas would be subject to flooding unless large quantities of water were diverted.

Withdrawals of about 13,500 gpm (approximately 20 million gallons per day) of "make-up" water from the Floridan aquifer would create a pronounced "cone depression" in the potentiometric surface in the vicinity of the wells. The shape, extent and depth of the cone would depend upon the number and spacing of wells and the pumping rates. However, measurable effects of the cone could extend out several miles from the center of pumping.

The potentiometric surface in the area would be depressed below present levels and, depending upon spacing, location, and pumping rates, could be depressed below sea level within 30 years. The cone of depression could induce the upward movement of highly mineralized water from the lower part of the aquifer, contaminating fresh-water supplies.

Cones of depression of individual wells could eventually intersect and interact with other "well cones" in the vicinity and lower the static water levels in all artesian wells in the area, including the municipal supply wells at Lake City and White Springs. The decline in artesian pressure could induce development of additional sinkholes in the area.

Tailing areas and slime ponds probably would be located near the plant site.

Processing of the ore would require the construction and excavation of ditches to circulate the ore and water, wash and separate the ore and to settle suspended material. Some of the water flowing in this closed circulation system would contain contaminants introduced in the ore processing system.

Ore processing may also cause ponds and ditches to flood, particularly if they are located in flood prone areas. Any flooding could allow water high in sediment content, and possibly chemical contaminants, to enter nearby streams and the shallow aquifer.

Pond and ditches may be located in areas where the surface materials are highly porous or in the vicinity of a sink hole. In these areas it is possible that water and

contaminants would infiltrate through the bottom or sides of the ponds and ditches and enter the shallow aquifer, the semiartesian, the Floridan aquifer or all three. Breaks in dikes or dams in tailing or slime ponds may temporarily allow sediment-laden water to enter nearby surface streams or the shallow aquifers.

Production of chemical fertilizer would have little effect on ground water hydrology.

Reclamation will create artificial lakes which may or may not be interconnecting. Single water bodies will provide local recharge areas to the nonartesian and/or secondary artesian aquifer. Created lakes in known recharge areas for the Floridan aquifer could be both adverse or beneficial depending upon the water quality of the water bodies.

5. Climate (microclimate) and Air Quality

During developmental drilling, internal combustion engines on drilling equipment would produce some particulates and normal by-product emissions.

A fire hazard would exist at times in areas affected by drilling upon the type of forest litter, its moisture content, ambient weather and type of vegetation in the immediate area of drilling.

The following impacts are foreseeable from land clearing mining operations:

- Particulates and gases would occur if slash is burned during logging and land clearing activities.
- Dust would be increased especially during the "dry" season.
- Local, microclimatic changes would result (wind patterns, increased soil and air temperatures, high evaporation rates, indirect effects on vegetative growth, etc.) as areas are cleared and mined.
- Increased auto traffic and equipment use would raise ambient level of pollutants.
- Dust and smoke might cause some eye, nose, and throat irritations to local residents and Forest visitors in the vicinity. Smoke would cause aesthetic problems. Ash and dust might drift and settle on recreational improvements and personal property and vegetation. Dust settling on vegetation would degrade aesthetics.

Particulate matter in the form of dry fertilizer material from the general plant area can be an airborne pollutant. The quantity of this pollutant depends upon the efficiency of the dust collection system installed. The following table lists the typical emissions and discharges from mining and processing phosphate rock.

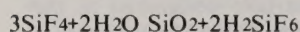
Process Source	Solids	Liquids	Gases
Mining	Particulates	Suspended Solids	Vehicle Exhausts
Washing & Flotation	Sands	Suspended Solids	--
Drying	Particulates	--	SO ₂
Calcining	--	--	SO ₂ , HF, SiF ₄
Grinding	Particulates	--	--
Phosphoric Acid	Particulates	ph, F, P, H ₂ SiF ₆ , CaSO ₄	HF, SiF ₄ , F
Superphosphoric Acid	--	--	F
Triple Superphosphate	Particulates	--	F
Sulfuric Acid	--	--	SO ₂ , SO ₃

The quantitative impact(s) on the general area are difficult to assess without accurate knowledge of the plant location and plant product out-put capacities (Process weight rates). The probability of pollutants reaching the surrounding area from a particular plant location could be determined from data on wind direction, wind velocities and other ambient weather parameters. This information, and the product output capacities, would provide the data necessary to estimate the quantitative aerial distribution of specific pollutants over an affected area.

A recent report entitled "Air Pollution in Florida" 1/ states that the pollution problems of fluoride have been solved to the limits of modern technology with significant decreases in fluoride emissions since 1962 despite a concurrent increase in phosphate production. Although Florida's Air Pollution Rules state that the latest technology shall be applied to reduce pollutant emissions, there remains the distinct possibility that fluoride pollutants would enter the atmosphere from gypsum ponds. The National Research Council (1970) states "in the manufacture of wet-process phosphoric acid, waste liquors and slurries are produced that contain gypsum, sodium and potassium fluorosilicates, hydrofluoric acid and fluorosilicic acids. . . The concentrations of hydrofluoric and fluorosilicic acid in the ponds gradually increase when the waters are recirculated into the manufacturing plants for reuse."

"Volatile fluorides vaporizing from the ponds are not controlled and may constitute 90 percent or more of the total fluoride emissions to the atmosphere" from the industry. 2/

The silicon tetrafluoride emitted to the atmosphere can react with atmospheric moisture and be precipitated off site as fluorosilicic acid by



The fluorosilicic acid thus deposited off site on vegetation and percolating into the soil with rainwater contaminates the foliar surface and soil water. This combination of air and soil-water pollution causes the concentration of fluorides in the leaf tissues of plants. This phenomenon has caused fluoride concentrations in plants and crops of citrus near Bartow, Florida, in native plants near Garrison, Montana,

and ponderosa pine near Spokane, Washington. Of particular concern is the transfer of fluorides from plants to herbivores. This occurs in wildlife and livestock grazing on plants containing high levels of fluorides. Problems of fluorosis have occurred in cattle in Tennessee, Wisconsin and other areas. Fluorosis is a bone disease and is not transmitted to man through the food chain. However, plants which have high concentration of fluorides, and are eaten by man may cause fluorosis in humans.

B. Living Components

1. Vegetation

Each drilling site would endure temporary disturbance and some trees could be scarred by the equipment. Insect attacks could kill the damaged trees and affect adjacent trees.

The natural vegetation as described in Section II of this report would be cleared before mining. Marketable trees would be harvested before clearing. The area would lose the modifying effects of the natural vegetation on the local climate and ground water. Revegetation will tend to restore some of these modifying effects, but not to the natural conditions because of changed soil-plant-water relationships. Approximately one-third of the disturbed area would remain in ponds after mining, resulting in a diminished vegetation area.

Of particular concern is the loss of the swamp community plants in the hardwood bays and hammocks and hardwood stringers along creeks. The loss is due to the complete removal of the overburden with the accompanying disruption of all plantlife growing there. In terms of plant succession where more diverse vegetative forms gradually replace less diverse ones, the mined area plant succession would be reversed to a situation favorable to pioneer plants characteristic of early successional vegetative forms. Generally, the reclaimed soil materials would not be suitable for the growth of the more diverse vegetative forms characteristic of the hardwood plant communities.

Nutrient cycles and energy flows linked with the vegetative food chain are very important to the wildlife habitat that exists in these areas. This chain would be interrupted and result in an adverse effect on wildlife and its habitat.

With increasing and continuing land development in Florida and the resultant loss of area exhibiting natural plant communities, the Osceola National Forest becomes more important as a forest environment. This loss of a forest environment would be significant when considering the need for natural green belt areas in Florida, particularly for the Jacksonville and surrounding urban populations.

1/ "Air Pollution in Florida," Status Report as of July 1, 1969. Prepared for V.D. Patton, Director, FA&WPCC for presentation to U.S. Senator Muskie hearing, Jacksonville, Florida 6/23/69.

2/ "Biologic Effects of Atmospheric Pollutants - Fluorides," National Academy of Sciences Committee on Biologic Effects of Atmospheric Pollutants, Division of Medical Sciences, National Research Council, 1970.

Sulfur fumes and by-products would enter the air from the chemical fertilizer plant and settle out on vegetation. Degree of damage which could occur to the surrounding vegetation is not known at this time.

Poor soil conditions as described under impacts on the soil would limit the kind of vegetation and its growth. Native plants on the Forest are growing under conditions much different than can be expected in a mined out area. Plants chosen for revegetation would be determined to some extent by a study of the reshaped soil. Soil preparation and soil amendments would be needed.

Slime pits stay wet for several years after abandonment and are difficult to revegetate. Willows and other water-tolerant species would tend to move in naturally and dominate on these areas. Sand tailings are generally droughty and are difficult to revegetate without covering with overburden, topsoil dressing, fertilizer application, etc. Mining processes that mix the sand tailings with the clay slime pits would make a better soil base for reclamation.

Pits needed to accommodate slimes from the National Forest lands would occupy 10,000-12,000 acres of private lands.

About one-third of the mined area (approximately 28,000 acres) will be left in water bodies thereby losing approximately 9,000 acres of land and its vegetation in the Osceola National Forest.

2. Wildlife and Fisheries

A common statement among persons unfamiliar with wild animal population is "...the destruction of wildlife habitat will result in a movement of animal populations into surrounding areas not directly affected by the given project." This is an incomplete and misleading assumption. Surface mining operations would cause some wildlife movement to similar habitats (if they are available) which may already be saturated with competing species. In this case, ingress of wildlife populations to these similar habitat areas would result in over populations and a net loss of that portion of the wildlife resource that is relocated.

Developmental drilling could disturb wildlife species, especially during the reproductive season. Disturbance of wildlife by such activity and traffic would affect hunting activity during the hunting season.

The major impact on wildlife is the disturbance of plant communities which alters the habitat of wildlife populations both within and adjacent to National Forest lands. The importance of this change varies by species.

While many people and government agencies are concerned over the possible loss of a considerable amount of public hunting land, they also are bothered by what effects surface mining the Osceola National Forest will have on the black bear. The State-wide population of black bear has dropped from an estimated 1,000 ten years ago to an estimated 500 to 600 animals. The current estimate for the Osceola National Forest is 75 to 100 animals. During the 1971-72 general hunting season, only two areas in the State had bear hunting. One of these was the Osceola National Forest. Three 3-day hunts were held in October, 1971, with 200 hunters participating and five bears taken.

Hunting success, reported bear sightings, bee hive damage and bear "sign" indicate that at least two-thirds of the bear population on the Osceola National Forest is in the proposed lease area. Surface mining and increased human activity in this area would destroy its value as black bear

habitat.

Although the black bear does not appear in either the Red Book or on Florida's endangered species list, it is of major significance due to its scarcity and rapidly diminishing habitat. It, like the panther, requires a large home range with minimal human disturbance. Surface mining would affect the most desirable bear habitat held in public ownership in northern Florida by increasing human disturbance and destroying vegetative communities of hardwood swamps.

The most sought after species is deer. The deer harvest for FY 1970 was 107 animals on the Forest. The area within the proposed mining leases is a better habitat than most of the remainder of the Forest. Approximately 14 percent of this area is in hardwood-hammock type. A large portion of this type stretches along 38.7 miles of stream and creek bottoms and provides superior deer habitat.

The permit area comprises about one-third of the total National Forest, and supports about one-fourth of the deer herd. The loss of habitat by conversion to water and the change of vegetation will reduce the carrying capacity of this area.

More than one-half of the Forest's turkey population is found within the proposed lease areas. Mining would destroy turkey habitat and eliminate turkey from the Western half of the Forest. The time required to restore turkey habitat comparable to that which exists is undetermined.

The Forest supports huntable populations of small game such as raccoons, opossum, squirrel, fox, quail, etc. plus a variety of nongame birds, mammals, reptiles and amphibians that would lose a large part of their habitat by the proposed surface mining operation.

The processing facility would have the greatest impact on aquatic fauna. The environmental effects of past and present phosphate mining in Florida have to be considered when evaluating potential changes in the existing ecosystem outside the Forest.

Environmental degradation can result from processing plant effluents of a continuing nature and high volume accidental spills.

The value of the Suwannee River as a fishery resource would be adversely impacted. Some of the species affected are shown in Table 6. According to a Florida Game and Fresh Water Fish Commission creel census of eight sport species conducted in 1970 and 1971, 63 miles of the Suwannee River plus Deep Creek received 18,848 fisherman trips. By using the Interior Department estimate of \$5.46 expenditure per trip, the sport fisheries resource contributed \$102,910.08 to the area economy. The estimated sustained annual economic value of the entire Suwannee River between Deep Creek and the mouth of the river is \$678,990.39. Watertown Lake is very close to economically mineable deposits and could be impacted by mining in the near vicinity of the Lake. Approximately one-third of this 50-acre managed lake is within the Forest boundary and the proposed mining lease area. The lake designated as the Watertown Fish Management Area in 1964 by the State is located near Lake City, and is considered an important freshwater fishery.

The fisheries resources in the streams on the west side of the Forest might be impacted by mining activities which create increased runoff, siltation (sediment load), turbidity, etc. Water temperatures would increase due to loss of protective vegetation. These occurrences could have

negative impacts on the Suwannee River.

Although many acres of open water would be created by mining, the need for additional fisheries has not been analyzed. A balanced fisheries program would require intensive, costly management. The demand for additional fisheries in the area may not justify such intensive management. Good warm-water fisheries require water 10' or less in depth, hence, the water-filled areas would be unsuitable as a fishery.

Relcaimed lands with numerous ponds may provide increased fishing opportunity, but stream fishing in a natural environment would be reduced by the mining operation.

TABLE 6: PERCENTAGE COMPOSITION BY NUMBER OF FISH HARVESTED IN THE SUWANNEE RIVER SPORT FISHERY, FINNIN SPRINGS TO LURAVILLE

SPECIES	1970-71 PERCENTAGE				TOTAL 1970-71
	FALL 1970	WINTER 1970-71	SPRING 1971	SUMMER 1971	
Bass	8.8	4.4	8.5	6.4	7.7
Bluegill	17.2	5.1	16.6	13.7	14.8
Redbreast	47.5	19.4	38.7	32.6	38.3
Other Bream*	11.0	8.9	15.4	12.4	12.4
Catfish	15.5	62.2	20.8	34.9	26.8
TOTAL	100%	100%	100%	100%	100%

*Category includes redear, spotted sunfish (stumpknocker), warmouth and flier.

Threatened Species (Defined in "Red Book")

The Florida Panther, an endangered species, would rapidly be eliminated from the western half of the Forest by mining, habitat depletion, and other human activity. Because of the large home range requirements for the panther, the total National Forest and surrounding forested lands remaining probably would be inadequate to provide suitable habitat.

The Red-Cockaded Woodpecker, an endangered species, would be severely affected through habitat destruction by mining. Most of the present habitat for this species on the National Forest is included in the area being considered for mining.

The Arctic Peregrine Falcon and Southern Bald Eagle are both endangered species and are considered together because the impact to both would be similar. The primary effect is the loss of potential habitat. Florida is gaining for 5,000 to 6,000 people a week. The population is predicted to double in 7 years so present habitat is being rapidly displaced by housing, shipping centers, highways, etc. Although the Forest may be supporting limited eagle and crane nesting now, in a matter of a few years the species might utilize such alternative locations to a much greater extent.

The alligator, also an endangered species, will be adversely affected by the drainage of swamps and bays. However, of the threatened species involved, it probably will be impacted to the least degree. This is due to the ability of the alligator to thrive in close proximity to human activity. If suitable ponds or lakes are established, the alligator will readily repopulate such areas assuming the major limiting factor - that of poaching - is handled adequately.

The impact to the Suwannee fishery would depend on water quality. The most likely impact is from accidental releases of effluents and slime pit breakage.

Relating to species considered endangered by the Florida G&FWFC, mining would practically eliminate the Indigo Snake and Florida Weasel from the area. The impact on the Wood Ibis and Peregrine Falcon would be similar to that of the eagle and crane; the loss of potential habitat.

3. Forage

Exploratory drilling is not expected to have any harmful effects on this resource.

Mining would result in a permanent loss of the forage resource from an estimated one-third of the area that will be converted to lakes and ponds. This would eliminate some 1,120 animal unit months annual grazing use or forage for 94 cattle yearlong.

Grazing use of the remaining mined area would be eliminated as mining progressed due to destruction of vegetation, and creation of physical obstacles. Natural recovery of the grazing values is unlikely to occur to any appreciable degree due to low fertility of soil residues, lack of seed sources, usable topography and hazards to animals.

4. Timber

Exploratory drilling should have little impact on the timber resource if present methods continue in use. The forest is predominantly well-stocked even-aged stands. Trees are spaced far enough apart to permit travel to drill sites. No damage to trees is expected.

Although the potential exists for mining up to 52,000 acres in the permitted area, the following calculations are based on the 28,000 acres of presently known mineable deposits.

Following mining, timber production capacity is expected to be significantly reduced. Natural regeneration will be severely restricted due to lack of immediate seed sources. Artificial seeding by helicopter is possible. Mechanical and hand planting methods will be hindered by the steep and rough topography. Steep slopes may restrict intermediate thinnings thus limiting tree growth and quality. Harvest cuttings would be more difficult and possibly uneconomical due to the presence of boggy areas. Essentially, mined areas would be rendered unusable for economical timber production. The eventual total annual growth loss at the end of the assumed 30-year mining period would be approximately:

Pine	Hardwood (includes cypress)
4,100,000 Board Feet (Sawtimber)	400,000 Board Feet
7,000 Cords (Pulpwood)	2,200 Cords

The above data is based on the following acreages that will be essentially out of production.

Forest Type	Acres	Acres
(converted to water) (unreclaimed land)		
Longleaf Pine	2,900	5,800
Slash Pine	4,000	8,000
Slash Pine-Hardwood	500	1,200
Bald Cypress-Water Tupelo	600	1,100
Sweetgum-Tupelo-Red Maple	400	700
Unclassified	900	1,900
TOTAL	9,300	18,700

The area proposed for mining contains several areas where a large investment has been made in regenerating young stands of timber. During the course of mining some of these would be cleared before they are old enough to contain merchantable timber. This would cause the loss of the original investment. In the absence of a mining plan, specific estimates of potential losses cannot be made.

Mining would concentrate the areas of young timber stands in one area of the forest. The 28,000 acres of valuable deposits make up 19 percent of the land on the forest that is managed for sustained yield timber production but after mining it would contain nearly 25 percent of the under 30 year old timber.

Concentration of young timber stands would have no effect on timber production but it could restrict future timber sales and associated forest resources, particularly wildlife, which are better served by a greater range of timber age classes.

Mining done during any one year would most likely be in one or two large blocks. Reforestation of these large areas would create stands of one age which are larger than desirable for multiple-use forest management.

The need to eventually break up these large stands into smaller ones would extend the time required to attain the balance of acres in the various age classes which is necessary for true sustained-yield management.

5. Recreation

Phosphate mining would affect many of the resources that contribute to the quality of recreation experiences currently available in the proposed mining area. The affected resources include: Water, soil, recreation supporting consumptive and non-consumptive uses of wildlife and the aesthetic qualities of these resources that provide a serene environment for hiking, fishing, camping, swimming and picnicking.

An active phosphate operation would also create noise, dust and transportation problems. Sounds from vehicles and other equipment would be foreign to those generally associated with the natural forest environment. Dust resulting from soil disturbances caused by vehicles and other equipment could be expected to settle in areas beyond the actual mining site. The physical effects of this dust would alter the visual quality of vegetation. New roads will be needed to accommodate mining vehicles. The impacts of road construction would reach beyond the mining site. Right-of-way clearings and drainage modifications would affect other landscapes. Increased traffic could be expected on existing roads linking mining access roads.

Other impacts expected to result from mining operations are increased litter along road sides, vandalism and general sanitation problems.

The location of the phosphate deposits, mining methods, and design of rehabilitation practices will influence the impact on the existing water resources, landscape features, and vegetation and wildlife.

Areas that could be expected to be disturbed include Cowhouse Bay, Deep Creek Drainage, Otter Bay, Robinson Creek, and Falling Creek. Archaeological and historical areas known to exist in the western half of the Forest would also be seriously impacted. Much of the western section of the Osceola Trail would be destroyed, as would parts of Big Gum Swamp and Impassable Bay.

With the disturbance of wildlife habitat on the above named areas, it is estimated that approximately one-third of the recreation days for hunting on the Forest would be lost. Since it is estimated that one-fourth of other activities such as hiking, camping and fishing take place on the lease areas, these recreation days also would be lost. In addition, it is expected that these losses would be transferred as "increased use pressures" to other parts of the Forest, particularly those related to wildlife habitat for hunting.

Since much of the high quality wildlife habitat areas are associated with hardwood species, these species occur in the above named creeks and bays, these areas probably would be lost for decades for hunting, fishing, camping and scenic viewing. It is unlikely that these areas could be restored to conditions existing today.

With approximately one-third of the mined areas being left in water filled pits, it can be assumed that an equal land area would be lost for land based recreation opportunities such as hunting, camping, picnicking, and hiking. If such water areas were developed, additional water-based recreation opportunities would be made available on the Forest. Such activities would include fishing, swimming, and boating. Enforcement of public safety for boating and swimming activities could create additional administrative work loads.

Visual impacts of scenic resources will be high in the areas along the Osceola Trail and Interstate No. 10. The visual impact along forest roads adjacent to and crossing the mined area will have adverse affect on recreation values.

6. Land Uses and Improvements

a. Special Land Uses

About 15 acres of land within the 28,000 acre mineable area are being used for apiary sites. They are scattered throughout the area on 40 sites. As the area is mined, these apiary sites would be eliminated because of the removal of all the flowering plant species. These sites cannot be relocated because the minimum spacing requirements precludes the addition of any more sites on National Forest land outside of the potential phosphate mining area.

Mining of the area occupied by improvements such as West Tower, the rifle range, the work center, etc. would require relocation of these facilities.

Powerlines and associated corridors would affect considerable acreages of both private and Federal land. Much of which would be outside the lease and mining areas. Impacts of these would include timber clearing, impaired aesthetics, soil disturbance, and interference with existing structural improvements.

b. Transportation

All resource activities and general administration on the National Forest are dependent upon the transportation system. The degree of disruption of the existing transportation system would be reflected directly upon the resource activities and general administration. Road relocations away from the mining pits would create impacts on presently undisturbed land. The Osceola Trail's usefulness is totally dependent upon the surrounding forest environment. It would no longer serve its intended purpose if this natural environment were changed to a non-forest type. Relocation outside the mining area would greatly increase the mileage and maintenance cost. Construction of the spur railroad, mentioned in item h of Assumptions,

Section I, would involve disturbance and commitment of an unestimated acreage of land for the right-of-way. This impact would be confined largely to private lands where it would have effects similar to those of the powerline described above.

c. Land Lines and Corner Monumentation

Approximately 282 corner monuments and related corners plus topographic features are subject to disruption and/or destruction. The major impact of these actions would be the cost of replacement and reestablishment of references.

7. Human Populations and Considerations

Phosphate deposits on private lands located west of the Forest will be mined whether or not federal minerals are leased, therefore, the following discussion describes the incremental environmental impacts of mining on the Osceola National Forest.

Based upon the assumptions stated in Item I, Section I, E of this Statement, the following illustrates impacts on people, individually and collectively, locally and regionally.

Employment - The 4 million ton/year phosphate processing operation would employ from 700-750 people. Approximately 200 of these would be trained company people and overhead moving from similar operations located in other areas. The remaining 500 would be local hires of unskilled or semi-skilled workers.

An analysis of current Labor Force, Employment and Earning Data for the 18 County Region reveals the following: (1) a low per capita personal income and (2) a very low rate of unemployment in the Impact Region.

The Impact Region's per capita personal income could be improved by the addition of 500 unskilled and/or semi-skilled workmen. The 200 skilled and overhead jobs associated with the operation would increase per capita personal income. These skilled employees and managers may be coming from outside the Impact Region which could cause additional demands for schools, hospitals, transportation, sanitation and other facilities within the community. There would be no significant impact on Health facilities or personnel. 1/

Civilian labor force data for the Impacted Counties as of March 1971, reveals a total of only 200 unemployed in Columbia County, 80 in Baker County and 80 in Hamilton County. Of this, 360 unemployed within commuting distance of the proposed operations; possibly no more than 100 workmen would be qualified or interested in employment. An estimated 400 new employees would need to be drawn from outlying regional counties - Putnam, Clay, and St. John - which have greater numbers of unemployed. With their families this could cause an influx of approximately 1200-1500 people to the Lake City area. This would represent an 11-14% population increase. 1/ Additional support services for new people could cause a total population increase of 20% to Lake City.

Reduced Industrial Base - Current statistics, show a decline in the Region's wood production due to a loss of commercial forest land to urban expansion and other uses. The estimated annual growth loss of 200,000 board feet of sawtimber and 140 cords of pulpwood per 1,000 acres from Osceola National Forest production could be a permanent

loss. This could further limit the Region's potential for increasing wages and salaries through value added wood-based manufacturing on a continuing yield basis.

Housing - Movement of approximately 500 workmen (management and labor) into the Lake City area could create an immediate demand for an estimated 400 homes. Additional building permits for residential construction could be expected. Alternate living quarters such as mobil homes could create a need for local rezoning.

Utilities - An estimated 400 million KWH of electricity will be required to operate, the proposed 4 million ton/year phosphate processing facility. Operation of the existing phosphate plant in Hamilton County is slowed during peak periods of power consumption to accommodate residential needs. Additional demands for industrial power of this magnitude will necessitate additional generating and distribution facilities in the area. Without additional power supplies, electrical brown-outs and black-outs could occur. Such power shortages would create economic and social impacts. Additional power lines may be required to meet increased electrical power supply demands. These power lines would cause impacts on the National Forest and private lands. A spur railroad several miles in length to the processing plant would constitute an impact on private lands in and adjacent to the right-of-way.

Impacted Private Ownerships in the Mining Area - None of the privately owned lands within the proposed lease area have permanent full-time residences. The 80-acre tract described as the NE $\frac{1}{4}$ NE $\frac{1}{4}$, Section 13 and SE $\frac{1}{4}$ SE $\frac{1}{4}$, Section 12 T26-R17E is known by heirs of the Asa Estate as the "old home place" and has sentimental value. Others have been subdivided and sold as hunting camp sites. Mining of phosphate on these private lands would have adverse social impacts on the residents.

C. Aesthetics

Phosphate mining will have a visual impact on the proposed lease area and could affect the entire Forest. The degree or intensity of the impacts of mining can only be assessed in qualitative terms.

In recognition of this difficulty and in response to the need for scenic resource evaluation criteria, the Forest Service has developed a system for visual resource analysis that is used in its Forest Landscape Management program. A brief summary of the system and its application are as follows:

Man visually identifies and differentiates objects because of contrast in the elements of form, line, color and texture. If the contrast is strong, perception is easy and the observer is aware of change. If the contrast is weak, a change may go unnoticed by the casual observer. The same rationale can be applied to the evaluation of a visual impact due to a change in the characteristic landscape.

Deviations effect visual changes. These deviations are either +(plus), those which borrow form, line, color and texture from the characteristic landscape or -(minus), those which do not. Deviations are the result of modification of vegetation, modification of land form, or addition of structure.

1/ North Central Florida Regional Planning Council

The method described in National Forest Landscape Management 1/ for evaluating the deviation impact is called contrast rating.

A rating score of:

0-10 means deviation can be seen but does not attract attention. The characteristic landscape dominates the observer's visual perception.

11-20 attracts attention. The visual change begins to dominate the characteristic landscape.

21-30 demands attention; it will not be overlooked. Visual change dominates the characteristic landscape.

Phosphate mining produces changes in three prominent environmental areas; vegetation, land form and structure. These changes contrasted with the visual elements (line, form, color and texture) in the characteristic landscape, represent minus deviations.

Phosphate mining has been rated in the 21-30 category where visual change is so drastic that it cannot go unnoticed.

In the forest this will hold true with or without rehabilitation, and even without the slime and sand settling areas. Contrast ratings indicate that with or without rehabilitation, phosphate mining, as a deviation upon the characteristic landscape of the Osceola National Forest, will demand attention from the observer, regardless of his observing position.

The major differences between the area in question being rehabilitated and unrehabilitated can best be described as follows:

Rehabilitation would result in Landscape Modification. Landscape modification occurs when the management activity is visually stronger than the surrounding characteristic landscape. Such activities are usually noticeable because they differ in scale or are more numerous than natural occurrences of a similar kind. They are designed to complement the form, line, color and texture of their surroundings but may not be completely unnoticeable because of their inherent characteristics.

No Rehabilitation would result in Landscape Destruction. Landscape destruction occurs when the activities of man abruptly alter the landscape with little regard for landscape values or future land uses. The alterations often destroy parts of land forms when no remedial measures are employed. Landscape destruction normally occurs rapidly and totally while landscape deterioration usually proceeds slowly and fragmentarily. 1/

The visual impacts will be considerably different on private land adjoining the Osceola National Forest. The characteristic landscape of private lands is basically form and open land interspersed with timber stands. A phosphate mining deviation on pasture land would be less obvious to the observer than the same operation on timbered land. The location of slime settling areas and the beneficiation plant on private land would involve "addition of structure" and an increase in percentage of water versus dry land.

Contrast ratings for private lands indicate that the rehabilitated deviation is likely to attract attention and may even dominate the characteristic landscape. It would still be broadly classified as a Landscape Modification, but would not be as noticeable as on National Forest land.

Without rehabilitation, the change would be on the borderline between Landscape Modification and Landscape Destruction depending upon the following factors:

- (1) Whether the landscape is primarily agricultural or forested, (the greater visual change would be on forested land).
- (2) The mining plan.

D. Historical and Archeological Values

Two of the six archeological sites identified on the Forest (Section II D and Map No. 7) are within the lease area. Mining activities would destroy these sites and any unknown or suspected sites which may be there. Increased human activities as the result of mining would affect other sites by increasing incidents of vandalism.

E. Highly Sensitive Area

The following Highly Sensitive Areas are wholly, or partially located within the proposed lease area:

Deep Creek	Otter Bay
Robinson Creek	Cowhouse Bay
Falling Creek	Two of the Six
Middle Prong of	Identified
St. Mary's River	Archeological
Impassable Bay	and Historical
Big Gum Swamp	Areas.

Impacts to the broad categories of highly sensitive areas are discussed generally below. Impacts to specific areas are discussed in more detail in subsections A through D.

1. Creeks and River Drainages

Any major land disturbance activity, such as phosphate mining, in any of these drainages would have major impacts. The diversity (key habitat) provided by the drainages would be reduced, if not eliminated, in some areas and could completely change the desirability of large areas for certain species (turkey, bear, panther). The aesthetic quality now provided by the drainages by change in cover type, change in height, texture, and contrast would be affected. The downstream effects to larger or major watersheds might be in the form of chemical and sediment pollution. The transporting of foreign materials (nutrients and sediment) would have an altering effect on downstream plant and animal communities.

2. Swamps and Bays

Any major land disturbing activity in swamps or bays would cause adverse impacts to water quality and landscape features. The habitat for many species of wildlife would be damaged. Creeks and rivers could be altered by activities which would change water quality and quantity within the swamps and bays.

Any activity which threatens the nature of these habitats threatens the continued existence of wildlife found in swamp and bay areas. (See discussion under Section II. Wildlife).

3. Other Areas

Two archaeological or historical areas are wholly or partially within the permitted area. Investigations need to be made to determine their individual significance.

1/ National Forest Landscape Management, Vol. I, USDA Agriculture Handbook Number 434. U.S. Government Printing Office, Washington, D.C.

IV. MITIGATING MEASURES

If the leases are issued, all Federal and State laws and regulations pertaining to phosphate mining and its associated effects on the socio/economic environment would apply and be enforced. Those mitigating measures not covered by existing laws and regulations would be included as terms and conditions of the lease(s).

The lessee would be required to submit a mining and reclamation plan for approval of the Geological Survey and the Forest Service. The plan would specify slope gradients, elevations, depths of lakes, final grade designs, soil testing procedures and method of revegetation. The lessee would be required to revegetate reclaimed areas successfully according to terms outlined in the plan. Mulching, fertilizing and replacement of topsoil would be necessary to establish plant growth and increase soil productivity. Native plant species would be required whenever possible.

The recommended mitigation measures, many of which are currently followed, will be presented on a component by component basis, i.e., soil, water, vegetation, etc. Since quite often the same mitigative measure applies to more than one component, the emphasis in describing the measures will be placed on the most critical component impacted by the action.

A. Non-Living Components

1. Geology

No mitigating measures are needed. The geologic and mineralogic rearrangement will result in no geologic hazards of physical nature such as landslides or land subsidence, or chemical hazards to the surrounding environment. One mitigating circumstance will occur within the usual course of mining and processing. Some phosphate minerals will be placed at the surface. These minerals will gradually dissolve and act as a fertilizer. 1/ This will occur on slime and overburden landfills, and to a lesser degree on sand landfills.

2. Mineral Resources

No mitigating measures are needed to protect other minerals. Phosphate operations will not harm or deny access to oil and gas exploration and development.

Uranium can be recovered during the fertilizer production process from the raw acid through solvent extraction. This would not, however, have any effect on the radium 226 or radon 222 decay products associated with gypsum pond water. Soil sealants should be considered as an aid in the prevention of radium 226 from infiltrating the ground water. According to the U.S. Environmental Protection Agency, no methods are known to mitigate post-mining radon 222 and gamma ray pollution.

3. Soils

a. On-Going Mining Operations.

In order to diminish the effects of on-going operations, vegetative cover would be required on temporary earthen structures such as dikes and dams and other disturbed areas outside working zones.

b. Reclamation

Soil impacts associated with phosphate mining can be mitigated in part by using current reclamation techniques. Conventional mining employs cuts 200 feet wide and up to 5,000 feet long. Overburden is cast in adjacent cuts, usually in high banks. Current reclamation techniques distribute the overburden in low mounds and provide space for future lakes. Overburden is distributed in previously mined cuts and reshaped. About 70 percent of the reclaimed land area would be reshaped to convex landforms with shapes, slope gradients and elevations comparable to existing flatwoods such as in soil associations 1 and 2. On the remaining 30 percent of the reclaimed land area, the overburden would be shaped to flat landforms comparable to shapes, slope gradients and elevations occurring in swamps, such as in soil associations 3 and 4.

Designated areas can be shaped with elevations higher than original elevations in order to create drier soils with deeper water tables. Areas reshaped one foot higher than original elevations would be more suitable for the growth of longleaf pine. Areas with elevations two to three feet higher would be more suitable for developed recreation sites than original elevations. Allowances would be made for long-term settling of the reshaped material.

Topsoil removed before mining would be used to topdress reshaped areas. The removed topsoil would be spread immediately over a reshaped area thereby saving some of the sprouts, live roots and seeds that can begin to grow and provide some native vegetative cover. Generally these are included in the upper one foot of soil. No more than 750 to 1,000 acres of mined-out area would remain exposed soil before revegetative practices are initiated.

Rapid revegetation would mitigate soil loss caused by wind and water erosion. Control measures would be employed by the lessee as specified in the approved mining plan to minimize off-site damage from sedimentation. Further erosion protection can be provided through the use of proper location and construction of road drainage. Pre-planning should limit access for each mining area to a single road.

The potential for leaks and spills from slurry pipelines can be reduced under a maintenance schedule requiring inspection and testing pressure systems periodically. Upon abandonment, slurry pipelines, temporary roads and utility corridors would be revegetated.

Slime ponds can be dewatered and covered with sand tailings and overburden to make them more suitable for building foundations and revegetation.

The procedures for erosion control and stabilization of mined-out areas should include soil sampling for fertility and erodibility and be correlated with plant nutrient requirements and slope dressing with topsoil. Placement of topsoil over infertile subsoil would improve conditions for plant growth and help inoculate the subsoil with micro-organisms.

Potential erosion from the dikes around the mine areas can be mitigated by maintaining ditches around the entire periphery of the mine operation, thereby creating a closed system.

1/ Florida Agricultural Experiment Station, Gainesville, Florida Journal Series No. 1222, 1960.

4. Water Resources

General - Water Quality

The State of Florida has established water quality rules which must be adhered to. 1/ The following sections apply to phosphate mining and the manufacture of phosphate related products.

Section 17-3.04, item 4, states that when sulfate, sulfide, free mineral acids, nitrates, and phosphates, . . . occur in any amounts in any individual body of water they will be suspect of degrading the water(s). "Threshold limits" have not been set.

Section 17-3.05, deals with specific water quality standards for wastes discharging to receiving waters. Of particular concern are the standards for fluorides, turbidity, dissolved oxygen, specific conductance, pH and temperature limitations. The rules state that the criteria "will be applied only after reasonable opportunity for mixture of wastes with receiving waters has been afforded. . . ." The "opportunity for mixture" will depend upon the quality of the receiving waters and approved discharge method(s). No statement is made as to whether the discharge will be measured before entering receiving waters. This is important if discharges are made by more than one individual, or industry along a stream the individual waste discharges (pollutants) will be confounded with the total industry discharge if an "opportunity for mixture of wastes with receiving waters has been afforded."

Section 17-2.06 deals with classification of waters by usage, and section 17-2.09 deals specifically with Class III Waters- -recreation, propagation and management of fish and wildlife. There are no specific criteria as to the types of industrial waste treatment that will be minimally required. Specific criteria exist for pH, dissolved oxygen, coliform bacteria, turbidity, . . . The important elements of the law in this section include the specification of the maximum and minimum limit values and "tolerances" whereby the quality of the receiving waters should not vary from the normal (or background) level.

The Florida Rules do not specifically relate the above sections to point (i.e. pipe) or nonpoint (i.e. broad land area) pollution sources. Guidelines, specific regulations and standards will be forthcoming from the Environmental Protection Agency in approximately one year for "Phosphate Production" as applicable under Public Law 92-500. 2/ The States will comply with these Standards.

Watershed, Hydrology, Quality

Lakes and other related recreation areas could be planned to create areas suitable for camping, hiking, fishing, canoe trails, etc.

Research in hydrological and limnological relationships are suggested to measure the impacts associated with phosphate mining. Incidental to the operation is the possibility of creating ground water recharge, provided water quality could be controlled through an artificial recharge system from the open water bodies.

A maximum amount of protection from surface flooding of Forest Service and private land must be provided by special drainage ditches within and adjacent to the mining operations. Provisions will be made (either) to line these ditches with erosion proof matting, or provide energy dissipators such as "steppedowns" or baffles, to reduce flow

velocity and resultant erosive power. Dewatering operations should utilize the above-mentioned ditches to carry water off. Provisions will be made to have intermediate detention ponds to settle suspended solids.

Applicable Federal and State water laws would be used in developing the mining plan. Double-dikes would have to be built around ponds and slime pits in flood-prone areas to protect the retention dikes from flood damage and to prevent "sluicing out" of pollutants from the drainage ditches at the base of the dikes. Reseeding and replanting operations, even if the plant materials are not the final vegetative cover, should be conducted immediately to provide a protective soil cover in the mined and land cleared areas.

Based on final determination of the extent of the phosphate deposits, provisions should be made to provide adequate buffer strips along either side of "live streams" to minimize channel diversions, avoid stream pollution and reduce dewatering problems and changes in normal base flow of streams.

Earthen dikes and dams must be constructed to Federal and State Requirements. 3/ Safety measures and inspections would apply to both dams and slurry pipelines. These pipelines may traverse several miles of swampy areas and would require special supporting structures to prevent breakage and slurry spills.

Water quality surveillance plans would be made jointly by the Forest Service and the operator in accordance with appropriate State and Federal statutes. Cooperation in collection and analysis of samples is necessary, and periodic analysis should be made by an "independent" lab. At least one year before mining operations begin, the Forest Service should establish stream flow gauging and water quality stations and monitor the major streams that would be affected to establish background information on selected parameters to be analyzed after operations are underway. One station would be needed on each stream (Deep Creek, Falling Creek, Robinson Creek, Middle Prong of the St. Marys River) with one control nearby to approximate a natural, undisturbed stream with similar hydrology. Stream flow gauging stations should also be installed with regulating outlet controls on diversion ditches, channels and sediment ponds to assist in measuring and adjusting outflows consistent with downstream needs and storm periods.

The potential erosion and pollution hazards would be greatest during storm periods. Reclamation plans must consider proper timing with respect to climatic events in applying corrective measures. This would facilitate establishment of vegetation, maintenance of normal flows, and control of flood flows. Any lakes constructed will be designed to minimize effects on existing drainage patterns.

1/ Rules of the Dept. of Pollution Control, Chapter 17.8, Pollution of Waters. State of Florida. Supplement No. 25 (no date).

2/ "Federal Water Pollution Control Act Amendments of 1972." Public Law 92-500. 92nd Congress, S.2770, October 18, 1972. Refer to Secs., 304(e) and 306(b) for applicability to phosphate Mining.

3/ Rules of the Department of Pollution Control. Minimum Requirements for Earthen Dams, Phosphate Mining and Processing Operations. State of Florida. Chapter 17-9, Supplement No. 27. Revised 12/8/72.

Ground Water

Any test holes which penetrate the secondary artesian aquifer, or which are in areas where surface water is of poor quality, should be properly plugged. In addition, construction trails should not divert stream courses and wet areas should not be filled.

After the mining begins, various mitigating measures can reduce the harmful effect on the ground water. Mining pits should not bisect major stream courses. While stripping away the overburden, the companies should pile and protect it to keep it from washing into water courses. Drainage ditches and ponds, necessary to contain diverted water, should be designed for flood flows. Test wells should be drilled and pumping tests conducted to determine the hydrologic characteristics of the Floridan aquifer, before the installation of production wells. These tests should be conducted under the supervision of the Geological Survey. The construction location, and spacing of production wells and pumping rates from these wells, should be carefully controlled to have the least effect on the potentiometric surface of the Floridan aquifer. Drawdowns, water quality, and discharge from production wells would be monitored at all times by the Geological Survey to control pumping rates.

Slime pits and ditches should not be located in flood-prone areas, nor should they be located in karst areas or in areas where the subsurface material is permeable, unless they are lined to prevent downward infiltration. Catchment ditches should be constructed around the ponds to insure that no contaminated water (e.g., fluorine, phosphorous and radium 226) moves laterally away from the ponds into the shallow aquifer. These ditches would be located around diked ponds in case of breaks. Sufficient surface storage should be provided for flood detention. Where possible, ponds should be constructed above the shallow aquifer and should be diked.

After the entire process is completed, the land would be reclaimed to the extent that further damage to the ground water would be held at a minimum.

5. Climate (microclimate) and Air Quality

General

The State of Florida Air Quality Rules have a nondegradation policy, i.e., "to protect the air quality existing at the time the air quality standards were adopted or to upgrade or enhance the quality of the air of the State." The overall objective is to eliminate, prevent, and control air pollution.

The following sections will apply to the proposed phosphate operation:

Section 17-2.03 generally discusses existing sources, operation rates, modification of sources, maintenance of systems, etc.

Section 17-2.04 specifically covers sources as they relate to their process weight rates. Specific criteria are also given for sulfuric acid plants, phosphate processing, fluoride production, phosphoric acid, triple superphosphate various process methods, diammonium phosphate, calcining and allied processes.

Section 17-2.05 specifically lists the "Ambient Air Quality Standards" - the maximum limiting levels of

pollutants existing in the surrounding air necessary to protect human health and public welfare (see appendix). These limits not only specify quantities but also the allowable time the pollutant may exist in the air.

Much of the phosphate-production-pollution problems of the plant operation will probably be mitigated by the mining companies' compliance with Florida air quality rules which states that the latest technology shall be applied when it "results in or is expected to result in lower or improved air pollutant emission."

During developmental drilling, fire risks will be minimized by a fire safety plan, jointly developed, reviewed, and approved by the Forest Service and the operator.

During Mining:

- Provisions should be made to keep vehicular traffic to a minimum, and roads and overburden spoils should be watered to alleviate dust problems.

- Slash and debris burning should be done by prescribed Forest Service methods.

- Chipping of slash, and provisions for slash burial, would alleviate much of the burning problem. This would return the organic matter to the soil, or chips could be used for mulch in recreational areas and for planting areas.

In ore processing the use of non-sulfur fuel (if practical) for the dryer would eliminate the SO₂ emission.

In the production of chemical fertilizers, fluorine can be recovered by use of the Swift or Swenson systems before entering the gypsum ponds. This would offset both fluosilicic acid as a potential water pollutant from dam breaks and seeps, and the emission of fluorine gas evolved from the ponds (usually 5 lbs. of fluorine as fluoride/day/acre of pond surface). Reduction in pond surface acreage would help offset gas evolution if the above systems are not used. Increasing pond depth would reduce water temperatures and lower mass transfer rates and evolution of the gas from the water.

Current State Air Standards (Appendix 4 - Section 17-2.03, para. (1) - Latest technology) would require the double absorption process in the production of sulfuric acid. This would bring emissions within current standards.

However, even though emissions might be small and dispersed, air quality surveillance stations should be established near the plant and adjacent Forest area to monitor the emissions and check for any cumulative effects to the local vegetation. During reclamation operations:

- Dust can be minimized by watering roads.

- Minimize use of vehicles other than diesel machines.

- Fire prevention measures should be planned, established, and enforced jointly by the Forest Service and the operator.

B. Living Components

1. Vegetation

It may never be possible to fully restore the plant communities as they existed prior to mining but the impacts can be mitigated to some degree by prompt revegetation of the mined areas.

Revegetation includes both planting and the preparation of the soil so as to sustain it. Soil preparation will involve landforming, top dressing, cultivation, and fertilization. Maintenance will be required until acceptable vegetation is permanently established.

Native vegetation will be reestablished as much as possible but non-native species, particularly grasses and legumes, will probably have to be extensively used. Some species that have been used for revegetating mined out areas in central Florida are: bahia grass, brown top millet, aeschyonome, hairy indigo and ryegrass. Some slash pine and citrus trees have been planted. Pine trees appear to be growing fair whereas citrus grows only fair to poor.

It probably will not be possible to reestablish much of the swamp plant community due to the expected soil conditions and the lack of reliable techniques for planting these species. A possible exception to this is bald cypress which has been planted on a fairly large scale.

A possible, but untested, method of reestablishing the swamp community would be to move fresh top soil with its root stock, seeds, and spores from a swampy area to be mined to a restored area. Part of the community might survive the move.

Top dressing the reclaimed area with top soil will speed restoration and improve plant growth. Topsoil dressing on heavy minerals mine spoil at Camp Blanding Military Reservation near Starke, Florida has made revegetation of the areas possible. In this area, planted vegetation will not grow on the infertile spoil without the topsoil being returned. After the topsoil is spread over the spoil, the reclaimed areas can be fertilized, limed, and planted to grasses, legumes and, in some cases, slash pine.

Details concerning soil and vegetative management practices and plant species specifications will be included in the mining plan.

Vegetation on unmined areas within the potential lease area should be left undisturbed. These areas should be protected to the extent possible from flooding and draining.

2. Wildlife and Fisheries

Wildlife

The Red-Cockaded Woodpecker is dependent upon mature pines (50 to 60 years old) with red heart disease for nest tree cavities. The landowners adjacent to the Forest, primarily pulp and paper companies, manage their forests on a 35 to 40 year rotation. The National Forest lands are managed on an 80 year rotation, and are therefore the primary source of red heart diseased trees. During mining, precautions should be taken to prevent removal of the nest trees.

Mature and overmature pines should be left around the perimeter of the pits for the nesting of Southern Bald Eagles. Such sites are a major attraction for nesting eagles, if within a quarter of a mile from the shoreline of a body of water.

Wood Ibis prefer stands of large cypress for rookeries. To provide future rookery sites, hammocks with this type stand would be by-passed. It may be necessary to control the water

table to preserve these stands.

Loss of the original habitat and types of feed for the deer and bear populations would occur as a result of mining. Seeding a mixture of different grasses and legumes on the mined areas would provide some feed for upland game species, however, the lack of cover will remain as a primary limiting factor. This substitution will provide only limited mitigation to ease the impact until other plant communities of higher sub-climax succession are reestablished on the reclaimed areas. Research would be needed to evaluate and determine if there are any substitute vegetation covers that could be seeded or planted on the mined areas to rebuild the habitat for the bear and turkey population within the mined area.

Buffer zones would be left on each side of streams where soils are supporting hardwood plant communities. These would provide wildlife habitat. Special consideration would be given to this requirement in the highly "sensitive" areas that are critical for the habitat of big game species as identified in Section III.

Other than reclaiming the mined areas to the present vegetative type and age, there is little specific mitigation that can be done for the Florida Panther, Indigo snake, Florida sandhill crane and Florida weasel. There is the possibility that these losses might be mitigated by replacement of this area with similar lands elsewhere.

Fisheries

Potential hazards to the Suwannee bass and other fish may be reduced by inspection of the dams and dikes on major watershed drainages at regular intervals by qualified personnel capable of recognizing a weakness in the dike before a break occurs. Dam and dikes would be designed and constructed by qualified engineers.

The stream habitat loss could be mitigated partially by shaping of the pits (Florida Game and Fish Commission's recommendations to the Florida DOT for utilization of highway borrow pits). In those areas that are going to be used for fishing, the main items that are considered essential are:

- The ability to manipulate water levels. The ideal set up would make it possible to lower the water level to expose 60 percent of the bottom every five or six years.
- A source of flowing water, either by stream inflow, or, if necessary, wells and pumping.
- Maximize the shoreline, if possible. The configuration should have narrow necks between larger open areas so individual lakes or ponds could be closed off.
- For best management, the lakes should range from 40 to 150 acres. Access roads will be left in good, useable condition.
- For maximum freshwater fisheries productivity, lake depths should be no more than 10 feet. Aquatic weed control will be facilitated by constructing lakes at least 200 yards wide.

If water levels can be controlled, it may be feasible to produce an important waterfowl area by draining, planting, and then flooding.

To reduce the soil erosion and siltation to streams, buffer zones on each side of the streams would be left in their natural state.

3. Forage

Forage loss can be mitigated by reclaiming the disturbed and mined-out areas and establishing an early cover of forage species. Soil fertilization and seeding to improve forage grasses could result in greatly increased forage yields and improved nutritive content as compared to previous production from native species.

Realization of these benefits by the grazing permittee would require an intensification and sophistication of management. The artificially established grazing lands would have to be fenced out from the native range for proper livestock distribution. Numerous lakes in the reclaimed lands might require additional fences for livestock safety. Maintenance of exotic forage species might require continued fertilization in order to sustain the high fertility levels required by certain species.

4. Timber

Prompt reforestation of the mined areas is the primary measure for mitigating the impacts of the proposed mining on timber production.

This reforestation is an integral part of the vegetation impact mitigation discussed in IV, B, 1.

5. Recreation

Mitigating measures needed to control or reduce the impacts to recreation resources would include the following

- Restricting mining operations in sensitive areas.

- Designing a comprehensive rehabilitation program for the disturbed soil, water, and vegetation areas to include:

- Soil engineering and soil conservation measures;
- Stockpiling of suitable topsoil for overlaying rehabilitated land;
- Planning and shaping water bodies to aesthetically meet the needs for fish and wildlife, water based recreation activities, such as water skiing, and land based recreation, such as picnicking, beaches, and camping areas;
- Planning for disturbed areas to be rehabilitated to satisfy recreation requirement not more than one year following mining;
- Reducing visual impacts caused by new utility rights-of-way, roads, and pipelines by blending with the natural surroundings.
- A monitoring program to evaluate the rehabilitation operations for compliance to the rehabilitation plan.

6. Land Uses and Improvements

a. Special Land Uses

Relocation will be required for facilities displaced by the mining operation.

b. Transportation System

In the event that phosphate operations were to disturb or obliterate all or any portion of any of these roads and trails, provisions would have to be made for keeping them open for travel. This would be accomplished by maintaining the facility in place or by relocation. In either event, access to the same part of the Forest which the facility initially served would have to be maintained.

In some situations, it may be desirable to relocate the road back through the mined area at the completion of the operation. In order to do this the density of the pit backfill must be adequate to support the road and its traffic, and the drainage sufficient to allow the road to drain.

All disrupted trails would have to be relocated outside the mined area. Relocation of the Osceola Trail would necessitate selecting an alternate route which would provide hikers with an aesthetically acceptable environment.

c. Land Lines and Corner Monumentation

Perpetuation of the precise location of presently monumented corners must be accomplished by the use of reference monuments located in accordance with "Manual of Surveying Instructions" of B.L.M. Remonumentation of corners following reclamation would assist in maintaining the integrity of the survey grid.

C. Aesthetics

Mitigating measures needed to reduce visual impacts upon the characteristic landscape include the following:

Reduce the magnitude of the minus deviations imposed on the characteristic landscape by:

1. Planning and designing all aspects of the operation and rehabilitation within a visual framework that borrows form, line, color and texture from the surrounding characteristic landscape.

2. Restoring where feasible, the capability of the land to produce vegetation and animal associations found in its former characteristic landscape.

3. Planning and design should be done by professional people such as planners, landscape architects, ecologists and biologists.

D. Historical and Archaeological Values

The Division of Archives, History and Records Management, Department of State for the State of Florida has "recommended a complete historical and archaeological study of the Osceola National Forest." The Antiquities Act of 1906, Executive Order 11593 and the Historic Preservation Act of 1966 also require an inventory. Part E, Section 6, of this chapter contains stipulations which will mitigate damage to the historical and archeological values of the Forest.

The results of these inventories, investigations, salvage and recordation will be reported to the Forest Supervisor and Historic Preservation Officer, State of Florida, before commencing mining operations.

All sites discovered as a result of the mining operations will be reported immediately to the Forest Supervisor and the Historic Preservation Officer, State of Florida.

E. Stipulations

If the preference right leases are issued, stipulations would be necessary to protect the Forest from undue or excessive environmental impacts. In essence, these stipulations become mitigating measures.

A great deal of coordination and cooperation between the mining companies and the United States Government is necessary. Liaison must be established between the companies agents and the Federal Authorized Officer. When an act of the company needs approval the company must contact the Authorized Officer. In addition to the Authorized Officer, one or more Forest Service employees may be assigned on a full time basis to insure environmental protection.

SECTION 1. GENERAL

(A) Applicability of Stipulations

The terms, conditions, requirements and prohibitions imposed upon the lessee by these Stipulations also are imposed upon the lessee's agents, employees, contractors, sub-contractors, and their employees. Failure or refusal of the lessee's agents, employees, contractors, sub-contractors, or their employees to comply with these Stipulations shall be deemed to be the failure or refusal of the lessee.

(B) Changes in Conditions

These Stipulations are based on existing knowledge and technology. They may be revised or amended by mutual consent of the Authorized Officer and the lessee at any time to adjust to changed conditions or to correct an oversight. The lessee and the Authorized Officer shall meet at least once a year to review advances in technology and, in a mutual endeavor, weigh and decide upon the feasibility of revising or amending existing Stipulations.

(C) Monitoring Program

The lessee shall prepare the exploration and mining plan, and, after approval of the plan, conduct an environmental monitoring program designed to provide a continuing check in compliance with these Stipulations and all Federal, State, and local laws, plus providing a factual basis for subsequent revision or amendment of these Stipulations, and give timely notice to the Authorized Officer of detrimental effects and conditions which require correction.

(D) Additional Stipulations

Due to a wide variety of physical, biological and socioeconomic conditions in the lease area, each lease may contain additional stipulations to meet specific conditions for mitigation.

SECTION 2. ACCESS AND SERVICE FACILITIES

(A) Transportation Corridor Plans

The lessee shall provide a master corridor plan as well as individual plans for roads, railroads, pipelines and utilities for approval by the Authorized Officer. Each plan shall include probable major design features and plans for the protection of the environment, prevention of pollution, minimization of erosion, rehabilitation and revegetation of all disturbed areas not required in operation of the transportation system, both during and after construction. The lessee shall, to the maximum extent practicable, make use of multi-use corridors for roads, pipelines and utilities. Lessee will be encouraged to apply the environmental protection aspect of this stipulation to private land.

(B) Regulation of Public Access

After road construction is completed, the lessee shall permit reasonable, free and unrestricted public access to and upon the road and right-of-way for all lawful and proper purposes except in those areas closed to public access by the lessee with the consent of the Authorized Officer. Whenever the Authorized Officer shall determine that the lessee's regulation of access and traffic is unreasonable, or that the lessee's provision of safety measures is inadequate, he shall so inform the lessee who shall immediately take corrective measures.

(C) Existing and Planned Roads and Trails

Where feasible, the lessee shall use existing roads and trails. Unless the Authorized Officer shall direct otherwise, roads and trails shall be located, constructed, maintained, and closed according to the specifications of the Forest Service and shall include drainage structures where needed.

(D) Waterbars and Breaks

The lessee shall divert runoff from roads and uphill slopes by means of waterbars, waterbreaks, or culverts constructed in accordance with Forest Service specifications.

(E) Shut-Off Valves

The lessee shall insure that the matrix transportation pipeline designs provide for automatic shut-off valves at each pumping or compressor station.

(F) Pipeline Corrosion

With regard to ore transporting pipelines, the lessee shall submit detailed plans to the Authorized Officer for corrosion-resistant design and methods for early detection of pipeline corrosion. These shall include: (1) pipe material and welding techniques to be used and information on their particular suitability for the environment involved; (2) details on the external pipe protection to be provided (coating, wrapping, etc.), including information on variation of the coating process to cope with variations in environmental factors; and (3) provision for periodic surveys for trouble spots, regular preventive maintenance surveys, regular surveys for external and internal inspections for abnormal potential patterns resulting from crossings with other pipelines or cables.

(G) Electric Transmission Facilities

The lessee shall design and construct telegraph, telephone, electric powerlines, distribution lines and other transmission facilities in accordance with the guidelines set forth in "Environmental Criteria for Electric Transmission Systems" (U.S.D.I., U.S.D.A., 1970), as now or in the future amended. Distribution lines shall be designed and constructed in accordance with REA Bulletin 61-10 (Powerline Contacts by Eagles and other large birds), as now or in the future amended. Lessees will have to make separate applications for rights-of-way for roads, power transmission lines, telephone and telegraph lines, and pipelines and for special land use permits and other rights to use land outside the tract subject to the phosphate lease for purposes connected directly or indirectly with phosphate development. Environmental stipulations will be included in such leases, permits, licenses, or other instruments. One such stipulation will be that where a road or exploratory site cuts a natural barrier used for livestock control, the lessee shall, at his own expense, close the opening by the use of fence meeting Forest Service Standards.

(H) Specifications for Fences, Cattleguards

Fences and cattleguards constructed by the lessee shall meet established Forest Service specifications and standards.

(I) Crossings

The lessee shall take all steps necessary to make certain that roads constructed under this lease do not prevent or unreasonably disrupt the use of existing roads, foot trails, pipelines, and other rights-of-way. This requirement shall include the construction of suitable crossings.

(J) Alternate Routes

If during construction the lessee's activities shall interfere with the free use of existing roads and trails by persons, whether or not recorded, he shall provide such alternate roads and trails as the Authorized Officer may determine to be needed.

(K) Off-Road Vehicle Use

The lessee shall use off-road vehicles in a manner consistent with applicable regulations.

(L) Public Improvements

The lessee shall protect existing telephone, telegraph and transmission lines, roads, trails, fences, ditches, and similar improvement during all activities and operations conducted pursuant to this lease.

(M) Restoration of Property Lines and Corners

1. All section and quarter section monuments shall be referenced before disturbance and remonumented and witnessed after rehabilitation.

2. All Forest Service property lines and corners shall be reestablished, monumented, posted, marked, painted and witnessed, to Forest Service standards.

SECTION 3. FIRE PREVENTION AND CONTROL

(A) Instructions of the Authorized Officer

1. The lessee shall comply with the instructions and directions of the Authorized Officer concerning the use, prevention and suppression of fires, and shall make every reasonable effort to prevent, control and suppress any fire on land subject to the lease. Uncontrolled fires must be immediately reported to the Authorized Officer.

2. The lessee shall not burn rubbish, trash or other flammable materials nor use explosives in such a manner as to scatter flammable materials on the lands, except as permitted by the Authorized Officer. A fire prevention and control plan for the mining operation will be prepared as a part of mining plan.

The lessee shall construct fire lines or perform clearing when determined by the Authorized Officer to be necessary for forest brush and grass fire prevention.

The lessee shall comply with the National Fire Codes on handling transportation, storage, use, and disposal of all flammable liquids, gasses, and solids.

(B) Liability of Lessee

The control and suppression of any fires on the leased lands (or on adjoining public lands which have spread from the leased lands) caused by the lessee or his employees, contractors, sub-contractors, or agents shall be at the expense of the lessee. Upon the failure of the lessee to control and suppress such fires the Authorized Officer shall take such steps as are necessary to control and suppress the fire, either alone or in conjunction with other Federal, State, and local authorities, and the cost of such control and suppression shall be borne by the lessee.

SECTION 4. FISH AND WILDLIFE

(A) Management Plan

The lessee shall submit, for approval by the Authorized Officer, a detailed fish and wildlife management plan as part of the exploration and mining plan, which explains the steps the lessee proposes to take to: (1) avoid or minimize damage to fish and wildlife habitat, including water supplies; (2) restore such habitat in the event it is unavoidably destroyed or damaged; (3) provide alternate habitats; and (4) provide controlled access to the public for the enjoyment of the wildlife resources on such lands as may be approved by the Authorized Officer. The plan shall include, but not be limited to, detailed information on activities, time schedule, performance standards, proposed accomplishments, and ways and means of eliminating or minimizing environmental impacts on fish and wildlife.

(B) Mitigation of Damage

Wherever destruction or significant disturbance of fish and wildlife habitat is inevitable, the lessee shall submit, for the Authorized Officer's approval, at least 60 days prior to the destruction or damage of the habitat, those measures which the lessee proposes to take to comply with the requirement of 30 CFR 231.4 (b) (APP. 16) to avoid, minimize, or repair injury or destruction of fish and wildlife and their habitat.

(C) Wildlife

The lessee shall conduct all operations under this lease so as to assure free passage and movement of game animals and protect wildlife from hazards.

The lessee shall post, in reasonable and conspicuous places, notices informing its employees, agents, contractors, sub-contractors and their employees of all applicable laws and regulations governing hunting, fishing and trapping.

(D) Fish Migration

The lessee shall provide for uninterrupted and safe upstream or downstream passage of fish. The lessee shall not erect or construct any artificial structure or stream channel change that causes a permanent blockage to movement of fish.

(E) Fish Spawning Areas

"Fish spawning areas" means the areas where fish deposit their eggs. The lessee shall protect spawning areas from sediment from all sources of construction or mining activity. Where soil material is expected to be suspended in water as a result of construction or mining activities, the lessee shall construct sediment settling basins or take other appropriate measures to permit the removal of silt before it reaches a stream or lake. Special requirements may be made by the Authorized Officer for each stream system to protect spawning areas. The lessee shall repair all damage to fish spawning beds caused by construction or operation activities.

SECTION 5. HEALTH AND SAFETY

(A) In General

The lessee shall take all measures necessary to protect the health and safety of all persons affected by its activities and operations and shall immediately abate any activity or condition which threatens the life of any person or which threatens that person with bodily harm.

(B) Compliance with Federal Health and Safety Laws and Regulations

The lessee shall comply with the Federal Metal and Non-metallic Mine Safety Act of 1966 (30 U.S.C. Sec. 721-740) and the Occupational Health and Safety Act of 1970 (29 U.S.C. Sec. 651-678) and all health and safety standards promulgated pursuant thereto.

(C) Use of Explosives

The lessee shall insure that all blasting operations, including the purchase, handling, transportation, storage, use and destruction of blasting agents are performed in conformance with 18 U.S.C. Sec. 841-848 and the regulations promulgated thereunder (26 CFR 181).

SECTION 6. HISTORIC AND SCIENTIFIC VALUES

(A) Cultural Investigation

The lessee will arrange for or perform an archeological and historical survey and evaluation on lease lands by an archeologist acceptable to the Bureau of Land Management and the U.S. Forest Service prior to development or mining. Such sites deemed significant by the archeologist and the Federal agencies under the criteria of E.O. 11593 and the Historic Sites Act of 1966 will be withdrawn from the lease. Those sites of lesser value will be salvage excavated if determined necessary to do so by the archeologist and the Federal agencies. The lessee will pay for all such actions.

(B) Objects of Historic or Scientific Interest

The lessee shall not remove, injure, deface or alter any object of historic or scientific interest, including Indian ruins, artifacts, and other archeological remains. Where a question exists as to whether or not an object is of scientific or historic interest, the lessee shall immediately bring the matter to the attention of the Authorized Officer for final determination.

SECTION 7. PESTICIDES AND HERBICIDES

The lessee shall not use pesticides and herbicides without the approval of the Authorized Officer. Pesticides and herbicides shall be considered treatments of last resort, to be used only when reasonable alternatives are not available and where their use is consistent with protection and enhancement of the environment. Where pesticides and herbicides are used, the type, amount, method of application, storage and disposal shall be in accordance with procedures prescribed by the Authorized Officer.

SECTION 8. POLLUTION - - AIR

(A) Air Quality

The lessee shall utilize and operate all facilities and devices in such a way as to eliminate or minimize air pollution. At all times during construction and operation, the lessee shall conduct its activities in accordance with all applicable State and Federal air quality standards and related plans of implementation adopted pursuant to the Clean Air Act, as amended (40 U.S.C. Sec. 1857 et seq.).

(B) Dust

The lessee shall make every effort to minimize dust problems. Where necessary, sprinkling, oiling, or other means of dust control shall be required on roads and trails. The lessee shall conduct processing operations so as not to create environmental or health problems associated with dust.

(C) Radioactive Pollution

The byproduct, gypsum, shall be adequately buried and covered to reduce radium 226, radon 222, and gamma ray emissions to levels prescribed by the Authorized Officer.

SECTION 9. POLLUTION - - WATER

(A) Water Quality

The lessee shall utilize and operate all facilities and devices in such a way as to eliminate or minimize water pollution. At all times during construction and operation, the lessee shall conduct its activities in accordance with all applicable State and Federal water quality rules and related plans of implementation.

(B) Disturbance of Existing Waters

All construction activities, exclusive of actual mining activities, that may cause the creation of new lakes, drainage of existing ponds, diversion of natural drainages, alteration of stream hydraulics, disturbance of areas of stream beds or degradation of land and water quality or adversely affect the environmental integrity of the area are prohibited unless approved in writing by the Authorized Officer.

The quality and quantity of water from the Floridan Aquifer shall be carefully monitored. If there are excessive drawdowns in the potentiometric surface, or any change in the natural quality of water, the lessee will be notified by the Authorized Officer. Measures will be taken by the lessee to correct the problem.

(C) Control of Waste Waters

In areas where overburden, water, or waste from mines or processing plants might contain toxic, saline material, or other pollutants, the lessee shall (consistent with "A" and "B" above):

1. Divert surface water flows and pumped ground water discharges around mining and processing operations. These waters shall be routed to the lower reaches of the dissected stream to insure that the quantity and quality of the downstream waters are sustained.

2. Dispose of effluent waters and solid waste (refuse) from mining and product processing in a manner which will not degrade the existing quality of surface and ground water

3. Rehabilitate the affected area (mined and plant site) upon termination of the operation, consistent with ecological principles and safety requirements to minimize or eliminate further possibilities of pollution both on and off site and see that drainage of the area is consistent to prevent abnormal changes in flood stages and permit routing of flood waters.

4. Monitor water quality and spoil and refuse for the presence of materials which likely will degrade existing water quality. Streamflow gauging stations will be installed to assess potential changes in surface flood flows and control sections may be installed to regulate streamflow.

(D) Cuts and Fills

The lessee shall not make cuts or fills, near or in streams which will result in siltation or accumulation of debris, unless approved in writing by the Authorized Officer.

(E) Streams

The location of crossings of perennial streams, lakes and rivers, must be approved in writing by the Authorized Officer. To control erosion and prevent degradation of water quality, the lessee may be required to leave undisturbed streamside "buffer" strips along designated perennial and intermittent streams. The location, width and extent of these strips shall be designated by the Authorized Officer.

(F) Road Surfacing Material

All road surfacing material used by the lessee must be approved by the Authorized Officer.

(G) Radioactive Pollution

Gypsum ponds shall be lined with chemical sealants as approved by the Authorized Officer to prevent downward infiltration of contaminated water. Prior to any planned discharge of contaminated gypsum pond water into surface streams, radium 226 and radon 222 concentrations must be reduced to Public Health Service recommended standards for safe drinking water (3 curies per 10-12 liters of water).

SECTION 10. POLLUTION - - NOISE

In the absence of specific noise pollution standards, the lessee shall keep noise at or below levels safe and acceptable for humans, as determined by the Authorized Officer.

SECTION 11. REHABILITATION

(A) General

The lessee shall rehabilitate affected lands to a usable and productive condition in accordance with a mining plan approved by the Authorized Officer. Rehabilitation methods include, but are not limited to, the following: leveling, backfilling, covering the surface with topsoil, revegetating, and shaping water ponds for enhancement of recreation, fishery and aesthetic values.

Prior to commencing mining operations, the lessee shall be required to obtain applicable bonds in accordance with requirements of the U.S. Geological Survey and the U.S. Forest Service to insure rehabilitation of the mining area consistent with sound restoration methods.

Top soil will be removed before mining and immediately spread on reshaped areas previously mined. This will allow some seed, roots and sprouts in the topsoil to grow and thereby retain some natural ground vegetation. The lessee shall leave reclaimed land in a usable, nonhazardous condition so that soil erosion and water pollution are avoided or minimized. The lessee shall, to the extent practicable, conduct such backfilling, leveling and grading concurrently with the mining operations. Upon removal of property at termination of the lease, the lessee shall, to the extent practicable, complete the restoration of affected lands to a usable and productive condition, as agreed upon in writing between the lessee and the Forest Service.

(B) Management Plan

The lessee shall submit, for approval by the Authorized Officer, erosion control and surface rehabilitation plans as part of the exploration of mining plan. The initial plan shall be submitted not less than 60 days prior to the start of the mining site preparation and updated each year on a mutually agreed upon date. The plan shall include, but not be limited to, detailed information on activities, areas, time schedules, standards, accomplishments, and methods of eliminating or minimizing phosphate development impacts. The lessee shall base erosion control plans and procedures on a maximum 50-year interval for the area. Procedures and plans shall consider flash flood effects, mud flows, slime pond breakages, and other similar types of material mass movements.

(C) Stabilization of Disturbed Areas

The lessee shall leave all disturbed areas in a stabilized condition. Stabilization practices, as determined by the needs of specific sites, shall include but not limited to; seeding, planting, mulching, placement of mat binders, soil binders, rock or gravel blankets, or other measures. Seeding and planting shall be repeated if prior attempts to revegetate are unsuccessful. All trees, snags, stumps or other vegetative material, not having commercial, ecological, wildlife, or construction values, shall be disposed of as directed by the Authorized Officer.

(D) Surface Disturbance On-Site

The lessee shall correct surface disturbance which may induce soil movement or water pollution, or both, whether during or after construction or mining, in accordance with the surface rehabilitation plan.

(E) Areas of Unstable Soils

The lessee shall, where possible, avoid areas having soils that are susceptible to excessive settlement, severe erosion and soil creep during construction or operation. When such areas cannot be avoided, the lessee shall design facilities to insure maximum stability. The lessee shall make soil foundation investigations as needed in conjunction with construction activities. The lessee shall make such data available to the Authorized Officer upon request.

(F) Materials

The lessee shall, when feasible, utilize sands from the mining operations for road beds, lake grading, fills and other similar construction purposes.

(G) Slopes of Cut and Fill Areas

To the extent consistent with good mining practice, the lessee shall maintain all cut and fill slopes in a stable condition for the duration of the lease.

(H) Impoundments

At the termination of the mining operations the lessee shall be required to remove any dikes, dams, spillways or other impoundment structures determined by the Authorized Officer to be an impediment to resource management of the National Forest lands.

(I) Flood Plains

The lessee shall not construct improvements or conduct operations in flood-prone areas when it is reasonable to expect risk to human life, pollution damage, or destruction of the existing environment without the express permission of the Authorized Officer and without providing for protection of such improvements constructed.

(J) Land Reclamation

The lessee shall, unless otherwise directed by the Authorized Officer, backfill, level, final grade, cover with topsoil and initiate revegetation of each segment of the operation area in accordance with the rehabilitation plan as soon as that segment is no longer needed, as soon as possible, but not later than one year after completion of the particular operation, unless an alternative schedule has been approved by the Authorized Officer.

(K) Overburden

The lessee shall segregate topsoil from overburden material and stockpile it separately for later use as top dressing for rehabilitation of disturbed areas.

(L) Revegetation

The lessee shall revegetate all portions of the leased lands which have been disturbed by his operations as soon as possible thereafter, in order to minimize and to prevent erosion and related problems. The lessee shall establish the vegetation on disturbed areas in accordance with an approved reclamation plan. Plans for revegetation, including species, density, and timing, must be submitted to the Authorized Officer for approval. The Authorized Officer may require any reasonable methods and types of revegetation, and, if he deems it desirable, may require the lessee to fence areas to protect revegetation.

(M) Surface Disturbance Off-Site

The lessee shall (1) eliminate or minimize off-site vegetative or surface disturbance to the extent that such elimination or minimization is consistent with practical construction operations, and (2) as soon as feasible, rehabilitate all disturbed areas to conform as nearly as practicable with the adjacent terrain and revegetate all areas adjacent to utility corridors or roads the surface of which has been disturbed.

SECTION 12. SCENIC VALUES

(A) Consideration of Aesthetic Values

Aesthetic values shall be considered in all planning, construction, reclamation and mining operations. All operations, including, but not limited to, design and construction of roads, pipelines and transmission lines, shall, where practicable, be performed so as to minimize visual impact, make use of the natural topography, and to achieve harmony with the landscape.

V. ADVERSE IMPACTS THAT CANNOT BE AVOIDED

This section discusses the residual adverse impacts which can be expected after all appropriate, feasible, effective, and reasonable mitigation measures have been applied. Mitigating measures have been applied. Mitigating measures are described in Section IV.

A. Non-Living Components

1. Geology

None

2. Mineral Resources

Approximately 1/3 of the phosphate contained in the matrix remains with the slimes. This mineral resource along with approximately 6500 tons of U_3O_8 would be removed from the Forest and stored in settling areas located on private lands. Slime storage areas on adjoining private lands at or above ground level will increase radioactivity in the area.

3. Soils

The total mined landscape will be changed and reshaped. Approximately 30,000 acres will be mined resulting in changed soils characteristics. Soil associations involved and their percent composition of the potential lease area are:

- a. High Mascotte - Leon Soils - Longleaf Pine - 5%
- b. Low Mascotte - Slash Pine Flatwoods Assoc. - 55%
- c. Rutlege - Plummer - Creek Swamp Association - 10%
- d. Pamlico - Cypress - Blackgum Swamp Assoc. - 30%

The reclaimed soil material will have different productive capacities for existing plant species because of the altered physical and chemical characteristics. It is unlikely that the reclaimed soil materials could support swamp hardwood plant communities equal to present productivity even if the hardwoods are reestablished.

Hydrologic characteristics of the soils will be changed and this will alter stream flow rates and water quality. The natural water regulating and filtering capacities of the soil will be changed in bays and floodplains.

Food chain relationships that begin in the soil with lower animal forms, particularly in the muck soils in the swamps, will be broken.

The conversion of land to water areas cannot be avoided. Approximately one-third of the existing land-soil area will be replaced by water, created by the removal of the matrix. This will permanently remove about 9,000 acres from timber production.

4. Water Resources

There would be a lowering of adjacent water levels in undisturbed areas during dewatering of the non-artesian aquifer especially during the dry season. Information on the amount and area of coverage are not available. Changes would occur in drainage patterns due to 31.5 miles of bisected streams and diked sedimentation ponds, causing changes in vegetative patterns of riparian species. It would be difficult to predict flood-flow nets and stages during and after the mining operation. These streambed disturbances

cannot be avoided and some erosion and sedimentation will occur along existing and newly created channels. Increased phosphate levels may occur in water bodies causing eutrophication and increased stream and lake temperatures (figures not available).

Slime ponds would decrease the permeability of surface materials and prevent the downward infiltration of rainwater locally. In addition, some local contamination of ground water in the shallow aquifer would occur. Mining pits would disturb subsurface materials and change flow and storage of water in the shallow aquifer and some stream courses. Withdrawals of water from the Floridan aquifer would lower the potentiometric surface over relatively large areas and affect water systems of Lake city and other users in the area (see Section VI, item B, Water Resources). Measureable effects could extend several miles from the center of pumping.

5. Climate (microclimate) and Air Quality

The two major pollutants, fluorides and sulfur dioxide probably would be mitigated to the extent that emissions would be "within" established standards. However, even though emissions might be "small" and dispersed, cumulative effects of emissions to the local vegetation are anticipated.

Fluorides have been known to injure plants in localized areas from concentrations as low as 0.1 ppb (parts per billion). 1/ They are cumulative in the plant and eventually kill the leaf tissue. Pines are sensitive to fluorides and loss of vigor and growth would occur. Several publications indicate fluorides can be transferred from plants to herbivores causing fluorosis, a disease of the bone.

Sulfur dioxide can cause leaf injury and a resultant loss of vigor and growth.

Continual small emissions of fluorides and sulfur dioxide may affect forest timber growth in the long run. Quantitative data on this cause-effect relationship as related to the phosphate industry is not available. Studies should be initiated to determine the effects of these emissions on plant communities.

No information is available concerning the effect of emissions on wildlife, apiaries, etc.

B. Living Components

1. Vegetation

The most obvious unavoidable impact is the complete removal of all vegetation on mined lands. This would occur over a 30-year period at a rate of about 750 to 1,000 acres per year. In addition, some 9,000 acres converted to water would be lost to vegetation.

Due to the soil alterations and loss of soil nutrients, the physical and chemical composition of the upper soil layer would change. Because of this change, it might not be possible to reestablish many native plants on the mined areas. Hardwood species making up the climax plant community require deep (3 to 4 feet) well-developed soils. Because of the top soil loss and soil alterations, it is unlikely that the hardwood species would reestablish themselves in the foreseeable future on areas disturbed by surface mining. Slash pine, a sub-climax species, does not require deep well-developed soils and could be planted or seeded on the reclaimed land. However, the growth rate probably would be slower because of an impaired physical soil condition.

1/ Berry, C.R. and H.E. Heggestad, 1968. Yearbook of Agriculture. Science for Better Living. Pages 142-146.

2. Wildlife and Fisheries

Certain species of fish and wildlife will be reduced or eliminated from the area by degradation of their habitat. The primary limiting factor for these species is suitable habitat. A list and discussion of impacts to the threatened and endangered species concerned is included in Section III.

Another unavoidable effect would be increased human activity from the mining operation which would severely limit use of the western half of the Forest for some species before the habitat is destroyed. In addition, the area would receive increased pressure from the recreationist using the lakes constructed as a by-product of the mining operations. Roads created by the operation would open more areas of the Forest to general public use. This increased recreational activity would be extremely difficult to mitigate for those species of wildlife intolerant to human proximity. The panther, bear, red-cockaded woodpecker, turkey and bald eagle would be affected most by this disturbance. Although this would be adverse to wildlife, the effect must be compared to the value to the public of availability of increased recreational use.

Other than reclaiming the mined areas to the present vegetative type and age, there is little specific mitigation that can be done for the Florida panther, indigo snake, Florida sandhill crane and Florida weasel.

In the case of fisheries and aquatic fauna, unavoidable effects may result from water quality changes due to accidental slime pit spillage and other effluent loads.

Increased siltation, water temperature and sedimentation would occur in the streams during mining and some portions of streams would be damaged while diverting or piping for crossings.

3. Forage

The most significant unavoidable impact to forage is the disturbance of soil and site which support the native forage species. Although the mining pits could be backfilled to the original ground level, the change in the physical makeup of the soil would probably require replacing native forage species with introduced species. Maintenance of the artificially introduced species would likely require continued maintenance of fertility levels with commercial fertilizer applications.

Interruptions of grazing programs and adjustment of grazing permits during the period of the mining operations cannot be avoided. These adjustments will likely involve reduction in numbers of animals grazed until rehabilitation measures become effective.

Changes in the type of forage and physical modification of the land will necessitate more intensive management and greater investment in range facilities such as fences.

4. Timber

Almost all of the impacts discussed in Section III-B-4 would have adverse effect on the timber resource and cannot be avoided if the mining is done. This can be summarized as:

a. A 9,000 acre reduction in timber producing land because of the creation of lakes.

b. A probable reduction in growth of 200,000 board feet per year per 1,000 acres (4.5 million bd. ft. over the 30 yr. mining period).

c. A high risk of the loss of 3,600 acres of hardwood forest communities.

d. Concentration of similar age classes in one part of the forest.

e. Creation of undesirably large timber stands caused by reforestation of large blocks of reclaimed land annually.

f. Loss of the financial investment in existing young timber stands.

5. Recreation

It is reasonable to assume that the existing recreation resources for such areas as the general forest area, Cowhouse Bay, Deep Creek, Otter Bay, Robinson and Falling Creeks would be progressively changed over a period of 30 years. The degree and severity of these changes would depend upon the extent to which mining operations are restricted in the most fragile areas. In the potential lease area the existing characteristic forest landscape would be completely changed and the existing opportunity for dispersed recreation activities would be reduced and altered. Furthermore, it is assumed that the initial results of reestablished vegetation on disturbed mining areas would not be as productive or as suitable for existing wildlife species as the native food and cover plants. The grassy open reclaimed area would attract different game species and hence alter the type of hunting opportunities presently available.

Any element of the mining operation that comes in contact with the Osceola Trail may degrade the recreation experience despite the mitigating measures. Where relocation of the trail would be necessary, it may result in the increased trail length or lower quality environment through which the relocated section passes. The Osceola Trail is not a historical trail.

With the mining operations, it is expected that the local noise and dust levels would degrade the recreation experience.

6. Land Uses and Improvements

The most significant unavoidable effect to land uses for apary purposes is the loss of the flowering hardwoods due to surface mining operations.

C. Aesthetics

The plant community, soils associations, and thus the characteristic landscape, would be altered.

D. Historical and Archaeological Values

Damage could result from mining activities even after competent premining inventory and investigation for historic and archaeologic material and frequent spot checks during mining. This could include destruction of archaeological and historical sites such as: Indian village areas, habitation mounds, burial mounds, and pre-ceramic campsites. The damage to these sites would be a permanent loss for educational and scientific interpretations.

VI. SHORT-TERM USE VERSUS LONG-TERM PRODUCTIVITY OF THE AREA

The phosphate mining program would be a short-term, progressive use involving actions applied to a portion of the total acreage each year. Since productivity presently includes commercial timber, wildlife, water, recreation, etc., any analysis must include these resources and their uses. The time frame used in this statement in identifying the impact on these values is relatively long, extending as far as 80 years, in order to equate the program with the approximate rotational period of the tree harvest. Trees represent the predominant life form of the area and the major support to the productivity of the biotic community.

Florida phosphate mines have been a major supplier of phosphate products for both domestic and foreign supply. It is estimated that by the year 2005 Florida phosphate mines, including the Osceola deposit, will no longer be productive at the current mining rate.

A. Soil

The natural soil will be changed along with its ability to grow and support plant communities as they now exist. It is not known how long it took for the existing soils to develop, but soil scientists estimate that the soils are several hundred to several thousand years old and the plant communities evolved along with the soils. Therefore, even with restoration of the soil, it is unlikely that it will be suitable for the growth of native plant communities that now exist, especially the swamp hardwood communities.

If overburden materials are reclaimed properly through replacement of the topsoil and application of amendments, grasses and pine trees can be established in a relatively short period after reclamation. Areas of sand tailings and slime pits, even with known reclamation measures, will be difficult to revegetate after mining. These areas will require much longer periods of time and more intensive reclamation measures to return to productive vegetation.

With proper reclamation measures designed to overcome identified limitations for each area, soil productivity will gradually improve through natural processes over a long period of time. An estimated one-third of the area that is now productive forest will be converted to water bodies.

B. Water Resources

The short-term effects on use would be a degradation of water quality, aesthetics, and fishing due to the accelerated erosion and sedimentation during mining. These effects would persist until the land was restored and stream channels stabilized.

A reduction in the storage water available in the shallow aquifer and a reduced water table would adversely affect the various resources for the duration of mining on the Forest. These effects from water withdrawals would diminish when the mining operation ended.

Created water bodies may require extensive and costly maintenance to control weeds and vectors (insects).

Flood flows would be unpredictable due to land form changes and stream severance, diversions, and rerouting by artificial structures. Low flows (distribution and timing), which are important in supplying local nonartesian aquifers, would be altered:

The withdrawal of approximately 20 mgd would create a cone of depression in the potentiometric surface of the Floridan aquifer which will lower the artesian pressure in private and municipal wells over a radius of several miles (including municipal wells at Lake City and White Springs).

This will require deepening of many wells and may restrict municipal and industrial development in areas where the cone of depression is extensive and deep. The duration of this cone would continue throughout the lifetime of the operation. At the cessation of the operation the cone is expected to recover, but the potentiometric surface will most likely be several feet below the present surface.

C. Climate and Air Quality

Short Term - Microclimatic changes may occur as a result of land clearing activities. Such changes would be of relatively short duration and are not expected to create significant problems.

Air quality would be degraded by continual small emissions during the life of the mining operations. These emissions would be "within" established standards. There is little available data to determine what effect these emissions would have on the short or long term productivity of living organisms.

Air borne dust particles from increased vehicle traffic, mining and processing operations may also degrade air quality. The severity of effect would depend largely on local wind conditions at any particular time.

Long Term - None, unless Section V. applies in the long-run to affecting timber resources; and smoke, dust and fumes create a "visual nuisance" and deters recreation use of the Forest.

D. Vegetation and Forage

The impact to the vegetation and forage resource as related to short-term use versus long-term productivity is directly dependent upon the time required to reestablish present environmental conditions or conditions suitable for sustenance of a forage resource. Plant succession is related to time. Certain grasses and slash pine are associated with early stages of ecological successions, and only a few years would be necessary for establishment of these species in the mined areas.

Some grass species can be introduced immediately where surface mining is completed. Pine is a sub-climax species which can be planted after the area is mined and seedbed restored. Certain hardwood species are climax and as a result of the surface mining may require several hundred years before suitable conditions exist on mined areas to support the hardwood communities.

E. Wildlife and Fisheries

The impact to fish and wildlife resources as related to short-term use versus the long-term productivity would depend upon the time required to reestablish present environmental conditions. Selected wildlife species could be reestablished by restoring required habitat conditions. Restoration of these conditions would vary as to time, depending upon the plant and animal communities desired.

In the case of plants and animals, i.e., browse species and deer, associated with early stages of ecological succession, only a relatively few years would be necessary. However, in order to restore the red-cockaded woodpecker habitat in

mined areas, a period of 60 to 80 years would be required. It would take even longer to restore lowland hardwood communities which support associated wildlife populations.

Due to soil and water changes, it may be impossible to restore suitable habitat for bear and panther.

Pre-mining drilling could create a short-term impact on wildlife species during breeding season. Such activities also could create adverse impacts during hunting seasons.

F. Timber

The conversion of at least 9,000 acres of timber on the Osceola National Forest to lakes will cause a long-term reduction in timber production. Slime pits needed to accommodate slimes from the Osceola National Forest lands will occupy 10,000 to 12,000 acres of private land, thereby taking this land out of production.

Even though timber can be reestablished on most of the reclaimed land, it is quite possible that there will be a permanent reduction in the productivity of the reclaimed sites because of the changes in soil conditions, particularly for the hardwood component.

G. Recreation

The portion of Osceola National Forest in the potential lease area now provides the opportunity for forest-oriented dispersed recreation use. This use includes hunting, hiking, driving for pleasure, gathering forest products, nature study, and primitive camping. Over a mining period of 30 years from 750 to 1,000 acres each year would be lost for dispersed forest recreation activities. At the end of 30 years, 1/5 of the Osceola National Forest would be permanently modified for dispersed forest recreation. This would place a greater long-term demand upon the remaining 4/5 to absorb hunting pressures if present levels are maintained.

In the long-term use the affected land could, through planned and implemented rehabilitation, be developed for water-oriented activities such as fresh water swimming, fishing, boating, lake shore camping, and hunting for waterfowl and open land game species. However, phosphate mining on the Osceola would modify management options to meet future recreational needs since water-oriented facilities will have already been created.

The "Outdoor Recreation in Florida Plan" indicates that in the year 2000, Northeast Florida will need considerably more recreation resources for hunting, nature study, horseback riding, hiking and primitive camping than it will need for water-oriented recreation facilities. Additional demand comes from tourists, 56 percent of whom enter Florida on Interstate Highway 75 a few miles west of the Forest.

H. Aesthetics

Phosphate development would affect approximately 1/5 of the Osceola National Forest, changing it to an industrialized area for at least 30 years. The proposed mining on the Forest, together with related service and utility corridors, would disturb 750 to 1,000 acres per year. Approximately one-third of the mined out areas would become lakes. The impact would extend beyond the boundaries of the National Forest since the slime and sand settling ponds necessary for the mining and beneficiating process would be constructed on private lands.

In the short-term, the visual resource normally associated with this section of the National Forest would be completely negated.

The long-term use, assuming an acceptable degree of rehabilitation would change from use that is dependent upon the existing landscape. An entirely different landscape will have been produced, which over a period of time may be accepted as naturalistic by the majority of the public. The type of use and the landscape's value as a resource depends upon future land use demands. Perhaps open space would be more valuable in the future, and the area in question would be capable of filling this need.

I. Land Uses

The loss of the apiary resource could be short-term, depending upon the restoration of flowering hardwood species. If the flowering hardwood species are reestablished, the long-term productivity of the mined area for the apiary resource would be restored.

VII. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The purpose of this section is to examine those resources which would be consumed, depleted, permanently removed or destroyed, and irreversibly altered by the phosphate leasing and mining program.

A. Depletion of Mineral Resources

Approximately 120 million tons of phosphate and 6,500 tons of uranium (U_3O_8) would be removed from the Osceola National Forest. 1/

Development, production and transportation of the phosphate products would require large and varied mineral resource commitments from outside the Osceola National Forest.

Unknown quantities of energy minerals, oil, gas, and coal, would be consumed directly and indirectly.

Various metallic and non-metallic minerals would be used in the manufacture of the machinery and equipment necessary to the operation.

Sulfur and other minerals would be consumed in the chemical processing of the phosphate.

B. Landform Changes

Mining of the National Forest would result in an irreversibly altered landform.

Landform changes fall into three categories:

1. Those associated with plant site development, road, pipeline and utility corridors.
2. Those associated with mining utilities, roads, pipelines and matrix removal.
3. Those associated with disposal and storage of sand, slimes and wastes.

The landform changes for plant sites, road and utility corridors is limited in acreage and extent of change. Some permanent roads would be established and retained for public use. The roadbed and foundation formation of the plant site would be essentially irretrievable.

The mining and matrix removal would take place on about 28,000 acres of land in the Osceola National Forest. Changes in the landform would occur on the area due to the removal of the mineral matrix and the casting of the overburden into a form dissimilar to the original land form. The removal of the matrix would result in formation of lakes and deposition of overburden would result in elevated lands. These changes would be irreversible and irretrievable.

Landform changes associated with disposal or storage of sand, slime and wastes are as follows: Slimes are stored within dikes and dewatered over time. The dikes may be up to 30 feet in height, including 7 feet of freeboard. Slimes may be stored in mined out areas where the depths may be up to 40 feet, or stored to a total depth of 15 to 23 feet above the original ground level in some instances.

Disposal of sands may be in conjunction with slime or separate. Increased land elevations would generally result from this storage. Wastes such as waters from the acidulation plants, etc., would require diking and ponding changing land forms near the plant site. These changes would be irreversible and irretrievable commitment of the landform.

C. Commitment of Water Resources

About 13,500 g.p.m. of deep well water would be used to support the water requirements of the mining operation. This would not be returned to the deep, fresh water aquifer locally.

Stream associated ecosystems would be converted to lake associated ecosystems over approximately 1/3 of the area with resultant changes in water quality, fisheries and aesthetics.

D. Soils

Surface mining would mix soil horizons into an undifferentiated mass. This change would permanently alter the existing natural soils by changing the combination of characteristics that gives each soil its productive capacity.

Soil properties of texture, structure, pH, and organic matter content would be irreversibly altered. Flora and fauna that depend on native soil associations would be lost or disrupted.

Existing soil and land form patterns that give the Forest its present characteristic landscape and vegetative pattern would be irreversibly lost.

E. Vegetation

A portion of the climax community, particularly the complex swamp hardwood community, could be lost and replaced by pioneer or sub-successional communities. It could take several hundred years before stable, mature plant communities develop. It is possible that the existing communities would never be replaced because of the major changes in soil conditions. Wiregrass (*Aristida stricta*), for example, does not readily reproduce. Its removal in mining could permanently eliminate it from the mined area.

F. Fish and Wildlife Habitat

The existing habitat for fish and wildlife would be lost and replaced by a modified habitat. This modified habitat would limit or eliminate suitable habitat for certain wildlife species, for example, suitable nest trees for the red-cockaded woodpecker might be eliminated for a period in excess of 50 years.

Mining activities would eliminate the present habitat on the west half of the Forest for panther, black bear and turkey. These species could not tolerate human disturbance associated with mining and the continuous use of access roads following mining. Basic changes such as elimination of hardwood hammocks which produce food and dens for the many mast-dependent and den-nesting fauna (bear, squirrel, woodpeckers and other non-game species) would modify and/or eliminate much of the wildlife indigenous to this area.

Although there are native populations representing several endangered or threatened species that may be affected, it is not anticipated that this single mining operation would result in the irreversible loss of any of these species. However, elimination of such species from the proposed lease area could represent a significant inroad on certain endangered populations such as the Florida panther.

The area permanently covered with water would be irretrievably lost to land-dwelling wildlife.

1/ One hundred percent recovery (120 mil. tons x 0.006%) would yield 7,200 tons U_3O_8 . Actual recovery, however, would be about 90% or approximately 6,500 tons U_3O_8 .

G. Timber

The mining operation would create at least 9,000 acres of lakes. This acreage would be lost to land use programs for production of timber.

The acreage of timber lost to lakes would be about 3,000 acres of hardwood forest types, 2,100 acres of the longleaf pine type, and 3,300 acres of slash pine. The annual growth loss is estimated to be 200,000 board feet per year.

It is possible that the swamp hardwood timber types would be completely eliminated because of the soil changes..

H. Aesthetics

The characteristic landscape of the Osceola National Forest is not static, but is constantly changing under various Forest management manipulations. Even with these changes it continues to be classified as forest landscape. Should phosphate mining occur, this characteristic (forest) landscape would be lost.

Rehabilitation through careful planning and design of the phosphate operation could produce visually acceptable variety. This man-made landscape would be entirely different from the characteristic landscape as we know it today. However, future generations would come to accept the new landscape as the characteristic landscape.

The evolution of a forest environment to a semi-industrialized one would be largely irreversible. Existing life styles, with their emphasis on aesthetics, forestry, and outdoor recreation would be radically altered.

I. Historical and Archaeological Values

The destruction of historical and archaeological features or the alteration of the ecosystem associated with these features would cause an irreversible loss to future educational and scientific interpretation.

VIII. ALTERNATIVES

A. Delay Action

1. No Action

Holders of phosphate prospecting permits have applied for 41 preference right leases.

The Mineral Leasing Act for Acquired Lands (30 U.S.C. 351-359) incorporates by reference the terms of section 9 of the Mineral Leasing Act, as amended [30 U.S.C. 211(b)], which provides:

Where prospecting or exploratory work is necessary to determine the existence or workability of phosphate deposits in any unclaimed, undeveloped, area, the Secretary of the Interior is authorized to issue, to any applicant qualified under this act, a prospecting permit which shall give the exclusive right to prospect for phosphate deposits, including associated minerals, for a period of two years, for not more than two thousand five hundred and sixty acres; and if prior to the expiration of the permit the permittee shows to the Secretary that valuable deposits of phosphate have been discovered within the area covered by his permit, the permittee shall be entitled to a lease for any or all of the land embraced in the prospecting permit.

Neither the Mineral Leasing Act nor the regulations promulgated thereunder define the phrase "valuable mineral deposit" or specify the manner in which the Secretary shall reach his conclusion. If the facts justify it, the Secretary may reach the conclusion that a valuable mineral deposit has not been shown to exist. However, the Secretary must make a decision whether to issue the leases or not.

2. Delay Decision on Leasing

This alternative involves the delay of a decision on issuance of leases until specific mining and reclamation plans and methods have been set forth by the mining companies applying for preference right leases. The Mineral Leasing Act does not require the Secretary of the Interior to make the decision to issue or not issue the leases within any specific time period.

Mining applicants may desire to include new or previously unapplied technologies as their operating plans are developed. These technological advances or changes could alter the impacts or create impacts on the environment other than those identified in current mining technology and described in the text of this statement. The relationship of these specific actions in the mining and reclamation plans to environmental impacts and their mitigation would require evaluation prior to the decision.

Environmental impact of this action would be deferred as no action would be taken until lease issuance. If issued, impacts would be similar to those identified in the text of this statement unless new technologies were specified in the mining and reclamation plan. Impacts and mitigation of impacts would be identified prior to lease issuance for any new technological applications in the various processes of mining, processing and reclamation.

B. Issuance of Leases

1. Issuance of All Leases Where Preference Rights Have Been Earned: No mining would be authorized until a mining and rehabilitation plan has been approved. Rehabilitation would be performed concurrently with mining.

This alternative has been fully developed in the body of the statement and is a point of reference against which to compare other alternatives. This alternative involves a significant impact on the environment and encompasses essentially the full range of impacts anticipated for phosphate mining in this locality (Ref. Sec. V).

2. Selective Leasing to Protect Sensitive Areas: The basic effect of this alternative is to limit issuance of leases to those land areas on which mining operations can be mitigated to an acceptable degree by known reclamation techniques. Those land areas which are judged too sensitive to be mined from the standpoint of fragile ecosystems, shallow aquifers, critical habitat of rare or endangered species or exceptional archaeological or historical values which would suffer irreparable damage from mining would be excluded from leasing.

Identification and delineation of sensitive areas would require additional field examinations by qualified professional personnel. The broad delineation of sensitive areas and preliminary examinations of the lands under lease applications indicate that 3,200 acres of the area of mineable phosphate deposits underlie ecologically sensitive land areas. An additional sensitive area is the Deep Creek drainage which encompasses 2,540 acres of mineable phosphate deposits, (Map 5-6, Sec. XI).

Reduction of acreage to be mined could result in a disproportionate reduction in adverse environmental impacts. This is because certain ecosystems are more sensitive to change than others, and by eliminating mining in these highly sensitive systems, a larger proportion of the total impact to the overall areas would be averted.

If leases are issued for parts of the area under permit, the environmental impacts will be comparable to those described in the text of the statement but of reduced intensity or quantity both on and off the forest.

Mining elsewhere would be required to produce mineral supplies to offset those made unavailable if this alternative is selected.

The selection method may create a patchwork pattern of mineable land for which an orderly mining program cannot be developed. This could prevent mining operations on the forest altogether.

Implementation of this alternative would require special legislation to give the Secretary of the Interior discretionary authority to disapprove lease application for environmental reasons. This legislation could provide for compensation to the lease applicants.

3. Leasing with Delayed Authorization to Mine: This alternative involves the issuance of the leases under conditions which would postpone authorization of mining until some future date.

It is based on the assumption that known reserves of phosphate in the U.S. are not adequate to meet probable future domestic needs and that it is likely that a national emergency will occur which would alter relative values of various natural resources and compel the development of this reserve.

This alternative would permit preservation of the environmental amenities, beneficial uses, and resource productivity of the forest ecosystem, until the phosphate resources were urgently needed or other developments occurred.

The alternative would (1) allow more time for the development of new and better techniques for reclamation of mined areas, (2) reserve these deposits for future emergency needs, and (3) maintain continued production of the renewable resources on the area for a longer period.

The delay period would be based on (1) overriding needs for phosphate due to a domestic crisis for which no other alternatives are available and/or (2) the industry's ability to demonstrate acceptable methods of reclamation.

A delay in mining these deposits would allow more time for such benefits as development of more efficient techniques for increasing yield of phosphate and other minerals from the ore; development of more efficient processes for utilizing phosphate; and development of more efficient techniques of reclamation. Also, withholding the federally owned phosphate deposit from the market would, in effect, maintain a reserve for future use.

The environmental impacts of this alternative would, in the short-term, be similar to the no leasing alternative. When mining is eventually authorized, the long-term impacts would approximate those described in the body of the statement except as mitigated by the potential developments mentioned above.

Accomplishment of this alternative may require new legislation.

4. Purchase of Comparable Lands: If the decision permits mining, the impacts would be those described in the body of the statement. In order to compensate for these losses to the forest, the government could purchase land, if available, adjoining or separate from the Osceola National Forest. This land could be used to provide suitable habitat for the endangered species or provide for the uses of the Forest that would be lost because of the mining. This option would require legislation in order to be implemented.

C. Deny the Issuance of Leases

This alternative constitutes a denial of the preference-right leases. If the Secretary of the Interior denies the lease applications alternate sources would have to be developed to make up the deficit or consumption would have to be reduced. The environmental consequences of obtaining alternate sources cannot be assessed unless these sources can be identified and the environmental impacts of mining in those specific areas evaluated.

Other environmental impacts arise from the fact that the Osceola phosphates would not come into the market stream as planned by the permittees. Analyses indicate that other sources of supply are available to meet the projected demand. However, the Osceola deposits may eventually be needed to meet the demand.

The outlook for eventual shortages of phosphate suggests that a decision to not authorize mining the Osceola now may merely defer to a future generation the question of whether the deposits should be developed at the expense of the then existing Osceola environment.

If a decision is made to deny the lease applications, special legislation may be necessary to provide compensation for the applicants. Compensation for the earned rights could either be the payment of cash, or a mineral exchange in the form of mining rights in other Federal mineral deposits, phosphates or others.

Cash Payment: A cash settlement for the preference right leases would be payment to the permittees (mining companies) for relinquishing their options to mine the lands presently under application. Authority for this action is contained in 16 U.S.C. Sec. 1534(a)(2). Cash payment for the option delays the time in which the National Forest might be mined. The purchase of these options by the Federal Government does not, in and of itself, guarantee that these same lands would not be mined in the future. The environmental impacts of cash payment cannot be assessed without specific information as to the mining companies eventual use of the funds.

Mineral Exchange: A mineral exchange could be accomplished by amending existing regulations. This alternative would involve issuance of non-competitive leases for valuable minerals on other public lands in lieu of the right to leases on the Osceola National Forest.

There appears to be no legal objection to the issuance of a new regulation which would provide that a preference right permittee may, upon surrender of that preference right, receive in exchange a lease on other lands if the exchange is in the public interest.

D. Alternate Sources or Reduction of the Use of Phosphate

1. Reduce Consumption of Phosphate

Consumption of phosphate has been reduced in detergents and other domestic uses and further reduction in demand implies a reduction in the quantity of available fertilizer. This could have serious consequences by reducing agricultural products at a time when world demand for those products is increasing. An educational program to prescribe appropriate use of fertilizers in the production of farm products could reduce consumption of phosphates as fertilizer.

2. Reduce Exports and Reallocate Existing Supplies

This would reduce the annual rate of consumption and extend the life span of the existing reserves in the United States. It would postpone for a period of time the demand to mine this area. When mined, the environmental impacts would be similar to those described in the statement. This action would have a detrimental effect upon our balance of trade.

3. Increase Production from Existing Sources or Import Phosphates

In order to meet increased demand, one could increase production from existing sources or import phosphate. Environmental impacts would depend on the circumstances, such as the area mined. Importing phosphate would adversely affect the United States balance of payments.

4. Development of Offshore Deposits

Offshore mines have been tried with unsuccessful results. Mining involves depths of approximately 800 feet and the costs are at present prohibitive. The costs are far in excess of 250 percent of the present market price.

5. Phosphate Recycling

This alternative contemplates the return of phosphates by using animal and human wastes as a fertilizer. The action would reclaim phosphate from reprocessed wastes.

Calculation made by the State of New York 1/ indicate that from 500,000 to 1,000,000 short tons of phosphate could be recovered from United States secondary sewage treatment plants. This represents approximately 1.5 to 3 percent of U.S. consumption assuming 50 to 100 percent recovery, respectively.

Some municipalities have attempted to utilize these waste products. If a process can be developed to a point of profitability, it could result in a reduction of the demands for phosphate.

6. Existing Slimes

This alternative considers the idea of mining out the old slime ponds. Reprocessing of dried up slime ponds has not been economical to date due to technical difficulties, however, as the price of phosphate increases this source of phosphates will probably be tapped.

The environmental considerations remain largely undetermined since the state of the art of processing waste products and slimes does not permit conclusions as to location, size, and cost of these reclamation processes.

7. Substitute Sources

Acid leaching and etching fluids contain phosphate. However, the recovery of phosphates from spent electroplating or polishing and acid leaching solutions is neither economical nor technically feasible at present. The amount recovered would be insignificant and of small value.

Basic slag and guano can also be written off as a substitute. Phosphorus bearing ores are avoided in both open hearth and basic oxygen furnaces, therefore, phosphorus bearing slags are not available. Guano deposits in South America have, for the most part, been depleted.

E. Lands Exchange

If a decision is made to issue leases on the 52,000 permitted acres, the western part of the forest might be exchanged for comparable lands outside the forest. The idea would be to exchange 52,000 acres of National Forest lands for lands similar in nature and value for inclusion in the National Forest System.

The impacts of this alternative would be similar in nature and magnitude to the mitigated impacts described in the text of this statement. Implementation of this alternative could require enactment of legislation.

F. Legislation

The Department of the Interior has proposed legislation for the disposition of minerals which is pending in Congress. The proposed legislation requires consideration of environmental factors before a decision is made to lease minerals. A copy of the proposed legislation is included in Appendix 18.

1/ Phosphorus in Waste-water by Leo. J. Hetling and Italo G. Carcich, New York State, Department of Environmental Conservation, Technical Paper No. 22, June 1972.

IX. CONSULTATION AND COORDINATION WITH OTHERS

A. Consultation and Coordination in the Development of the Proposal and in the Preparation of the Draft Environmental Statement.

1. Agencies, Groups and Individuals

The draft environmental impact statement was prepared by an interdisciplinary team comprised of individuals from the U.S. Department of the Interior and the U.S. Forest Service. Expertise in wildlife biology, outdoor recreation, mineralogy, geology, hydrology, and forestry were represented on the team. In their search for and in the data gathering process, team members developed and maintained contact with Federal/State agencies, mining companies, universities and individuals. Through this process experts in chemistry, physics, and meteorology were contacted for their assistance. A list of the agencies, companies, universities, and individuals contacted is available for public inspection at:

Eastern States Office
Bureau of Land Management
7981 Eastern Avenue
Silver Spring, Maryland 20910

2. Other Consultation and Coordination

Forest Service personnel provided the Bureau of Land Management with letters written by concerned citizens as well as copies of several local newspaper articles. Therefore, the BLM was aware of the local interest and opinions related to the possible lease issuance and subsequent mining on the Forest. Further, visits by BLM team members familiarized the team with the local area and the local people's sentiments pertaining to the creation of a mining operation on the Forest.

B. Coordination During Review of the Draft Environmental Statement

1. Distribution and from whom comments were requested.

The draft environmental impact statement was filed with CEQ on December 12, 1973, and a notification of its availability published in the *Federal Register* on December 19. Approximately 200 copies of the draft statement were initially distributed to Federal, State and County agencies; U.S. Senators and Representatives; State Senators and Representatives; Preference Right Lease Applicants; Other Phosphate Companies; Conservation and Environmental Groups; Libraries; and others. During the review period an additional 150-175 copies were distributed to other requesting organizations and individuals. A complete distribution list indicating agencies, organizations and individuals is on file and available for public inspection in the Eastern State Office, Bureau of Land Management, 7981 Eastern Avenue, Silver Spring, Maryland 20910. Comments were requested from all recipients of the draft environmental impact statement.

An official news release of the draft statement's availability was issued concurrent with the *Federal Register* notice of December 19, 1973. A subsequent *Federal Register*

notice was published January 8, 1974, along with an official news release notifying the public of exact dates, times and places for the public hearings.

Following distribution of the draft environmental impact statement, a meeting was held with representatives of the U.S. Forest Service (January 4, 1974) to discuss the approach and procedures to be taken in preparing the Final Environmental Impact Statement. Informal discussion and correspondence with the Forest Service, National Park Service, Environmental Protection Agency, Bureau of Outdoor Recreation and other Federal/State agencies has been conducted during the interim between the draft and final statement to insure that all interested agencies' comments and views are considered in the final statement. All review comments received have been considered in the preparation of the Final Environmental Impact Statement.

2. Written comments received.

Approximately 80 written comments were received in connection with the hearings and as a result of solicitation by news releases, *Federal Register* notices, and information distributed with the Draft Statement. It is difficult to estimate the number of persons represented by these written comments as many letters were from conservation and environmental protection groups and organizations. Written comments from Federal/State agencies, organizations, and individuals possessing special expertise are included in paragraph 7.

3. Public Hearings.

Public hearings were held in Jacksonville, Lake City, and Tallahassee, Florida on January 15, 17, and 21, 1974, respectively. The purpose of these hearings was to receive views, comments, and suggestions relating to the draft environmental impact statement. At the conclusion of the presentation by each witness, members of the hearings panel questioned the witnesses for the purpose of clarifying or expanding witness testimony.

Hearings convened at 10:00 a.m. on each of the above days and continued until all interested parties voiced their views. Malcolm P. Littlefield, Administrative Law Judge from the Department of the Interior's Office of Hearings and Appeals, Arlington, Virginia, conducted the hearings. A panel/staff of officials representing the U.S. Department of the Interior and the U.S. Forest Service received the testimony.

Total attendance at the three hearing locations was approximately 200 persons including the thirty-five persons who presented oral testimony. Three hearing locations - Jacksonville, Lake City and Tallahassee, Florida - were selected to provide interested persons the convenience and opportunity of attending and participating in the hearings proceedings. Sessions were started in the morning in order to provide as long a time as possible for witnesses. It was not necessary to continue the hearings into the evening since all witnesses were accommodated during the day. Those persons who could not attend were permitted to offer their views and comments in writing. Both written comments and oral statements were considered to the date of publication of the final statement. A complete transcript (including exhibits) is available for public inspection at the following offices:

Office of Communications
Room 7218
Department of the Interior
Washington, D.C. 20240

Eastern States Office
Bureau of Land Management
7981 Eastern Avenue
Silver Spring, Maryland 20910

Regional Forester
U.S. Forest Service
1720 Peachtree Road, N.W.
Atlanta, Georgia 30309

Forest Supervisor
U.S. Forest Service
214 South Bronough
Tallahassee, Florida 32302

District Ranger
U.S. Forest Service
Osceola National Forest
Lake City, Florida 32055

4. Summary of Public Response.

Comments and testimony were received from a diverse group of individuals, groups, organizations, companies and agencies. They offered various positions ranging from setting the forest aside as a scientific study area to support for the proposed action. Over 95 percent of the respondents opposed issuance of the phosphate preference right leases and subsequent mining of government-owned phosphate on the Osceola National Forest.

The views expressed, together with the reasons given in support of them, will be presented to the responsible officials along with the Final Environment Impact Statement and other data for their use in making a decision on the applications for the leases.

Both the oral testimony at the hearings and the written comments received concerning the adequacy and accuracy of the draft environmental impact statement reflected a high degree of public satisfaction with the quality of the document. Comments, such as, "We have reviewed a number of environmental impact statements and this is one of the best we've seen" or "Overall the statement is excellently prepared and the wildlife section is outstanding" were among the statements made. Those persons who expressed at the hearings, reservations as to the adequacy of the quality of the statement were encouraged to follow-up with specific suggestions. Witnesses often referred to the statement as evidence in support of their position, usually on opposition to issuance of the leases.

All comments (written and oral) were analyzed to determine revisions necessary and to strengthen and improve upon the draft statement. For the purpose of meaningful, comprehensible comment, these points are summarized here as "issues." A general summary of issues is set forth below. Response to and disposition of more specific issues is included in paragraph (5).

5. Summary of "Issues."

a. Legal Aspects

The Kerr-McGee Corporation commented that the draft environmental impact statement goes beyond the requirements of the National Environmental Policy Act in that it considers the environmental consequences of the proposed phosphate development on other than National Forest land. However, other comments maintain that the environmental effects on private lands outside the Forest should be more strongly emphasized.

One comment pointed out that alternatives in the draft environmental impact statement which would deny the issuance of the preference right leases or require the Secretary of the Interior to take no action on the lease applications are not consistent with current legal and constitutional authority, namely the Mineral Leasing Act of 1920 and the Mineral Leasing Act of 1947 for Acquired Lands. However, some Federal agencies and several State agencies and conservation groups insist that the National Environmental Policy Act, the Weeks Law, the Multiple Use and Sustained Yield Act, the Endangered Species Conservation Acts, and several Florida statutes, regulations and policies all preclude the issuance of the preference right leases.

The issue of whether the phosphate deposit in the Osceola National Forest constitutes a "valuable mineral deposit" within the meaning of the Mineral Leasing Act of 1920 was brought out in several comments. One element of "costs" suggested to be needed in this determination are those which would arise due to the loss of renewable and other resources if the phosphates were to be mined.

b. Reclamation

Numerous comments received dealt with the size and significance of water bodies which would remain after the proposed mining and processing operations, the construction of above-ground slime ponds, and the capability to reclaim spoil piles and the dikes of slime and water storage areas as discussed in the draft environmental impact statement.

It was pointed out that the draft statement did not mention areas similar in character to the proposed lease area which have been reclaimed to a forest environment.

c. Socio-economic Aspects

The draft environmental impact statement was held not to contain information sufficient to enable the reader to assess the impact of increased traffic on area highways. A federal agency commented that the draft statement does not properly cope with the problem of persons who would be dislocated if the phosphates were to be mined nor with the capability of local services to meet the needs of new people coming into the area to carry on the proposed mining and processing.

The draft statement mentions that the proposed development will cause the water table to drop and this would necessitate the deepening of many wells. One person questioned whether the affected well owners will be compensated for the well-deepening.

A request to include a table or graph forecasting future increases in recreation use of the Forest in the final environmental impact statement was received.

The supply and demand forecast for phosphate, as described in the draft environmental impact statement, received considerable attention. Many groups and individuals were concerned with the possibility of Florida's phosphate being exported to the Soviet Union, and wished to have the discussion on exports and domestic consumption predicitons amplified. Special concern was voiced that the Osceola and other domestic phosphate reserves would be developed to satisfy foreign demands. Further discussion of how to deal with the problem of a dwindling supply of an essential but finite phosphate resource was requested.

d. Impacts

Most of the specific comments received dealt with the manner in which the draft environmental impact statement assessed the impacts of the proposed mining and processing operations on soils, water resources, air quality, vegetation, wildlife and fisheries, forage, timber, recreation and human populations.

The draft statement's treatment of impacts on the soil texture, profile, structure, and nutrient levels was questioned in several comments.

Several comments expressed the feeling that the draft environmental impact statement did not adequately treat the possibility of damage to the Suwannee River, the Santa Fe River, Ocean Pond, and swamplands in the area of the proposed operation.

The draft statement's treatment of impacts on surface water and on the Floridan aquifer was the subject of several comments.

During oral testimony in Tallahassee, one person expressed an opinion that the draft statement did not adequately deal with the impact of the proposed operation on the wiregrass plant community.

The U.S. Environmental Protection Agency expressed concern that the draft environmental impact statement did not adequately address the hazards of exposure to increased levels of radioactivity nor the effects of increased fluoride emissions on vegetation arising as a result of the proposed operation.

Testimony and written comment suggested that the draft environmental impact statement did not adequately assess the impacts of the proposed operation on wildlife habitat in general and on endangered species in particular. It was also suggested that the draft statement should discuss the economic value of the fisheries resource in the Suwannee River in view of the potential hazard that resource faces.

A Federal agency commented that damage to the Osceola Trail should have been included as an unavoidable impact in the draft environmental impact statement.

Five comments suggested that the draft statement should mention the source of electrical power required for processing the phosphate ore and should address the impacts that providing the necessary power will cause.

Two comments took issue with the draft environmental impact statement for assuming that slime ponds and dikes would remain after the proposed mining and processing operations were completed. It was maintained that there are new improved mining and processing methods available which render the use of slime ponds and associated dikes unnecessary.

e. Alternatives

One comment suggested expansion of the draft environmental impact statement's treatment of the alternative of leasing with delayed authorization to mine. More detailed treatment of alternate sources of phosphate and reduction of the use of phosphate was also required.

6. Response to and disposition of more specific issues.

Issue a:

Comments were received raising issue with the assumptions as to size of slime and water bodies, construction of above-ground slime ponds, and the anticipated success of reclamation of spoils and slimes.

Issue Raised By

- U.S.D.I., Geological Survey
- U.S.D.I., Bureau of Sport Fisheries and Wildlife
- U.S.D.I., Bureau of Outdoor Recreation
- U.S.D.A., Forest Service
- U.S. Environmental Protection Agency, Region IV
- State of Florida, Department of Natural Resources
- Florida Defenders of the Environment
- Florida Trail Association
- Izaak Walton League - Indiana Division
- Sierra Club, Florida Chapter
- S.E. Lumber Manufacturers Association
- Global Exploration and Development Corporation
- Kerr-McGee Corporation
- College of Engineering, University of Florida
- and several individuals

Response:

Existing pebble phosphate mining operations in central Florida employ various methods of dewatering waste slimes and reclamation of spoils. Different methods result in different land-water ratios in the post-mining landscape. Many factors affect the ability to dewater slimes, reclaim spoils, reduce size of water bodies, and eliminate or reduce the need for above-ground slime storage facilities. Some of these factors are: depth of the phosphate matrix, depth of water table, thickness of overburden, success in stockpiling topsoil, and the availability of sands for mixing with the slimes.

Success in dewatering slimes is affected by the type and composition of the clays involved. Clays associated with pebble phosphates consist of three major types which usually occur in mixtures comprising varying percentages of the phosphate matrix. These clays are the montmorillonites, kaolins, and attapulgites (commonly called Fullers Earth). Studies conducted by the University of Alabama, in cooperation with the U.S. Bureau of Mines, have shown that attapulgite clays definitely affect the settling of kaolin and montmorillonite clays. Clays with higher contents of attapulgite tend to stay in suspension and are more resistant to dewatering. Conversely, the clays with higher contents of montmorillonite are more likely to settle and are easier to dewater and reclaim.

The viscosity of phosphate slimes is directly related to the amounts of attapulgite clays. An increase in viscosity is indicative of the presence of attapulgite clays and inversely related to good slime settling characteristics. Therefore, the relative proportion of different types of clay in the slime has

an influence on the requirements for slime storage impoundments and the success of reclamation efforts.

Successful dewatering of slimes and subsequent reclamation of slime areas is dependent on the amount and nature of the sand in the sand-slime admixtures. Studies by the Tuscaloosa Metallurgy Research Laboratory, University of Alabama, indicate variations in the particle size of sand have significant effects on the dewatering process.

A clay sample, collected and analyzed by the Bureau of Mines at the Occidental phosphate mining operation in Hamilton County (northern Florida), showed total clay percentages in the slime ranging from 8 to 15 percent. The percentage of montmorillonite, kaolin, and attapulgite clays are not known at the Occidental site or on the Osceola National Forest. Total clay percentages in Polk County (south central Florida) range from 2 to 3 percent up to 50 to 60 percent.

Testimony received at the public hearings mentioned the Brewster System, developed and now in use, by Brewster Mines in central Florida. The objectives of this system are to eliminate or reduce the need to construct ponds, dikes, and dams for the impoundment of slimes above-ground; and to improve the reclamation process. The success of the Brewster System appears to be dependent on the total percentage of clays in the slimes and the percentage of montmorillonite clays in the total phosphate matrix. Brewster Mining Co. has had reasonable success using the Brewster System in the western part of Polk County where significant amounts of montmorillonite clays are present.

Present efforts to settle slimes by various dewatering and sand admixture systems should consider the 23 percent P_2O_5 that would be left in the slimes of the Osceola phosphate deposit. The phosphates P_2O_5 stored in the slimes will be considered a resource in future years when the original sources have been exhausted. Recognition of this source of phosphate has already occurred in central Florida where operations are presently reprocessing slimes.

The interest shown by industry, Federal and State agencies, and the Universities, promises additional information on methods of handling and processing phosphates associated with different types and proportions of clays.

The contention that slime ponds will not be required, that waste slimes will not be stored above-ground, and that all waste slimes and sands will be returned to the mined-out cuts cannot be supported as appropriate to phosphate operations on the Osceola National Forest. Mr. Brooks, in his letter of February 27, 1974, confirmed the need for some slime impounding during start up and possibly during normal mining and beneficiation operations.

In summary, uncertainties prevent a definitive answer at this time as to the size of slime and water bodies and the degree of reclamation success.

Issue b:

Clarify and expand a reference in the Draft Environmental Impact Statement to the Suwannee River as a proposed Wild and Scenic River.

Issue Raised By:

--U.S.D.I., Bureau of Outdoor Recreation
--Sierra Club, Florida Chapter
--Environmental Action Group

Response:

On March 15, 1974, the Secretary of the Interior approved the Bureau of Outdoor Recreation's study, *The Suwannee River, A Wild and Scenic River*. The Secretary has submitted a report to the President and Congress recommending that the Suwannee River be added to the National Wild and Scenic Rivers System. Changes have been made to the environmental impact statement to reflect current developments.

Issue c(1):

The statement does not address the question of how much of the 20 MGD makeup water will run off from the mining area.

Issue Raised By:

--U.S. Environmental Protection Agency, Region IV.

Response:

The phosphate mining and processing operation described uses a "closed" water circulation system. Of the 20 MGD make up water needed, only minor amounts are lost or discharged to an "unconfined" environment. These losses occur through evaporation, leakage, and occasional planned releases of gypsum pond water (figures not available). All other water is used in the production of phosphoric acid or stored in slime or gypsum ponds.

Issue c(2)

The final statement should address the questions: who will be responsible for downstream flooding effects, cleanup and restoration, monetary settlement and pollution activities in the Suwannee River Watershed if it becomes a designated Wild and Scenic River?

Issue Raised By:

--Environmental Action Group

Response:

If the decision is made to proceed with issuance of the preference right leases, Departmental attorneys will be consulted to determine whether liability for downstream damages and cleanup can be established in the leases and, if so, to what extent.

Issue d(1):

The aquifer recharge status of the Osceola Forest is not shown.

Issue Raised By:

--U.S. Environmental Protection Agency, Region IV

Response:

Different zones of recharge and the relative direction of flow are discussed on page II-22. Flow lines appear in figure 22 and figures 22, 23, and 24 indicate general trends for the Forest and vicinity. As discussed in the Statement, the general flow depends on local recharge and may differ from regional direction and time of year.

Issue d(2):

The report discusses recharge through the confining beds (dense subsurface layers of material) with no differentiation of their relative importances.

Issue Raised By:

--U.S.D.A., Soil Conservation Service

Response:

Greater recharge rates to the aquifer will be achieved through caves and sinks than through confining beds given the same unit cross sectional area for permeability. However, based on incomplete knowledge of all caves and sinks in the area, we have concluded that the contribution is primarily through the confining beds.

Issue d(3):

If the water table is lowered as a result of phosphate operations, will the affected well owners be compensated for the cost of deepening their wells?

Issue Raised By:

--Environmental Action Group

--One Individual

Response:

On page IV-2 under "Mitigations" and on page IV-5 under "Stipulations" are discussions of the need to install and monitor both test wells and production wells to establish optimum rates of water withdrawal in order to minimize secondary effects on wells in the surrounding area. If the decision is made to proceed with issuance of the preference right leases, Departmental attorneys will be consulted to determine whether liability for cost of deepening wells can be established in the lease and, if so, to what extent.

Issue d(4):

The Statement was not clear on how recharge to the aquifer may be affected should mining occur.

Issue Raised By:

--Environmental Action Group

Response:

An explanation of how recharge to the aquifer is adversely affected is given on page III-3 and 4. The statement also recognizes that recharge may be induced locally by the construction of ponds and lakes (III-4). Theoretically, if the permeability of the reclaimed land is less than the existing permeability, then recharge to underlying aquifers would be affected. However, we cannot give a definite answer at this time since we are not aware of any available permeability data for reclaimed land nor for the National Forest land.

Issue d(5):

The recycling of 80 percent of the water for production of phosphate is more realistic than 90 percent.

Issue Raised By:

--Sierra Club

Response:

The environmental statement indicates that a phosphate production plant which involves the process described in Section I will recycle approximately 90 percent of its required water. This value was obtained from individuals operating similar plants and from discussions with Federal agency officials who deal with this industrial commodity.

Issue d(6)

The environmental statement does not estimate the number of gallons of water per day that would be pumped to dewater the mining pits.

Issue Raised By:

--One individual

Response:

We do not know the transmissivity (lateral flow of water) of the nonartesian or secondary artesian aquifers on the forest. Thus, we cannot at this time estimate the rate of dewatering.

Issue d(7):

The Environmental Statement does not consider the possibility that a lowered water table could seriously reduce water flow from springs along the Suwannee and Santa Fe Rivers.

Issue Raised By:

--Sierra Club

Response:

Page III-3 discusses the effect of dewatering the shallow (non-artesian) aquifer and reducing the base flow of some streams in the area. The dewatering operation on the National Forest would not affect the springs along the Suwannee or Santa Fe Rivers as these springs are artesian and thus derive their water from confined aquifers at considerable depths and/or from exposure of these aquifers along the river.

Issue d(8):

The apparent discrepancy between land subsidence and induced development of sinkholes due to a decline in artesian pressure should be clarified in the final environmental statement.

Issue Raised By:

--U.S.D.I., Bureau of Sport Fisheries and Wildlife

Response:

The discussion on page IV-1 deals with subsidence, a general settling of land which could cover a large area due to "geologic and minerologic rearrangement." This is not expected to occur.

Sinkholes resulting from decreases in artesian pressure are localized collapses of the upper geologic strata and generally are confined to less than 1-5 acres.

Issue e:

Machinery associated with the mining operations can cause noise pollution which would have an impact on human activities and wildlife.

Issue Raised By:

--Izaak Walton League, Indiana Division

Response:

Analysis of machinery noise levels indicates that vibrating screens in the washing plant have the highest decibel ratings of any installed equipment. It is estimated that in close proximity to the screens, the decibel level may be as high as 90, however, at ground level and 100 feet from the plant, the level will not exceed 20 decibels. At 100 yards from the plant, the noise level is not noticeable.

Motorized vehicles associated with the mining operations are not expected to have more impact on human activities and wildlife than vehicles associated with recreational activities in the forest, timber harvesting, and Interstate 10 traffic which traverses the Osceola National Forest. Draglines used in the removal of overburden are electrically operated and ordinarily do not create high noise levels.

Issue f:

The suggestion was made that mining and processing phosphate matrix from the Osceola National Forest might increase ambient radiation to a level that would cause problems for the environment and the population exposed to this radiation. These problems could develop if Uranium (U_3O_8) and associated Radium 226 was exposed by mining. Further, the uranium would be a constituent of fertilizer and contaminate the nation's agricultural fields where applied. Also the Radon 222 level of slime ponds, or waste mixtures of slimes and sands, would increase radiation hazards to a degree whereby the land could not be used for housing; radium precipitated in the by-product, gypsum, is sufficiently hazardous to prevent utilizing the gypsum; and Radium 226 contaminated water produced in various processing operations could contaminate ground waters and the underlying aquifer.

Issue Raised By:

--U.S. Environmental Protection Agency, Region IV
--and one individual

Response:

A recent U.S. Environmental Protection Agency report titled "Reconnaissance Study of Radiochemical Pollution from Phosphate Rock Mining and Milling" states uranium present in the phosphate matrix of Florida contains Radium 226 and Radon 222. During the double liming process Radium 226 and Radon 222 are precipitated in the by-product gypsum. Ra-226 and Rn-222 can cause radioactive pollution of plant-site water and spoil banks. Radon 222 and gamma rays are emitted from the by-product gypsum. Based on this new information a discussion of radioactive pollution impacts and mitigating measures have been added in Section III and IV of the final statement.

We are informed that U_3O_8 levels are approximately twice as high in Central Florida phosphate matrix compared with levels of phosphate matrix in northern Florida.

Issue g(1):

The possible contamination of Ocean Pond as a result of sulfuric acid processing in the immediate area needs to be considered.

Issue Raised By:

--Two individuals

Response:

Ocean Pond does not appear to be in jeopardy. Under assumptions, paragraph 1(a), the statement specifies that plants, tailings, and slime ponds would be located off the Forest. The proximity of this facility would not constitute a hazard to Ocean Pond.

Issue g(2):

The potential impact of sulphur dioxide, acid mist, and fluoride emissions should be defined and examined more thoroughly in the environmental impact statement.

Issue Raised By:

--U.S. Environmental Protection Agency, Region IV

Response:

The potential emissions are described on pages III-4 and III-5. A discussion of published material on the effects of fluorides is given on pages III-5 and III-6. On pages IV-2 and IV-3 there is a discussion that most of the emissions will be mitigated. On page V-1 the statement is made that "continual, small emissions of these pollutants may affect forest timber growth in the long run. Quantitative data on this cause-effect relationship as related to phosphate industry was not available."

Issue h:

The draft environmental impact statement failed to quantify impacts on soil nutrient losses, sedimentation, and soil changes from air pollution.

Issue Raised By:

--Izaak Walton League, Indiana Division

Response:

The statement provides some estimates on sedimentation and erosion effects in the mined area (Section III-A). However, data on mined soils similar to those on the Osceola National Forest is limited. We do know that these impacts would occur, but it is difficult to estimate their magnitude. Therefore, in some cases, evaluations and conclusions had to be based on professional judgments and opinions.

Issue i:

The draft environmental impact statement should consider the effects of the altered soil profile on vegetation, water percolation and aeration.

Issue Raised By:

--Alachua Audubon Society
--Southeastern Lumber Manufacturers Association
--Hon. William Lehman, Representative from Florida

Response:

The altered soil profile will affect vegetation, water percolation, and aeration as well as other soil properties. These effects are assessed in light of available information and best professional judgment under Section III, Environmental Impacts of the Proposed Action.

Issue j:

The statement does not contain reference to areas of similar character which have been reclaimed to a forest environment.

Issue Raised By:

- U.S.D.I., Geological Survey
- U.S. Environmental Protection Agency
- S.E. Lumber Manufacturers Association
- One individual

Response:

The statement has been revised on page III-3 to emphasize that to this date reforestation on reclaimed lands has been performed on a relatively small scale compared to the proposed lease area on the Osceola National Forest.

Issue k:

A table or graph quantifying the increasing public use of the forest for outdoor recreation activities should be presented in the final statement.

Issue Raised By:

- U.S.D.I., Bureau of Outdoor Recreation

Response:

The statement specifies recreation visitor-days use on the forest and within the lease area. In addition the statement indicates growth of use by predicting hunting use will exceed capacity by 1990. Other sections of the statement document the recreation value of the forest to the Jacksonville area and general tourism. A graph of recreation use for the Forest has been included in Section II, B, 5.

Issue l:

Prior to any change in surface topography, a systematic on-the-ground survey for archaeological and historical sites should be conducted by professional personnel followed by scientifically planned excavation of any sites located.

Issue Raised By:

- Secretary of State, State of Florida

Response:

The environmental statement specifies "a reputable inventory and investigation must be a pre-requisite to any surface activity." Cultural investigations are also required by stipulations in Section IV 6(A). "Investigating" includes scientifically planned excavation where values are significant.

Section IV-D of the draft statement has been revised to reflect additional protective measures for the preservation of archeological and historical sites.

Issue m:

Since a portion of the Osceola Trail would be destroyed by the mining operation, it appears the lessee cannot comply with Stipulations "(I)" and "(J)" of Section IV. Section V should reflect the impact on the Osceola Trail as unavoidable impact.

Issue Raised By:

- U.S.D.I., Bureau of Outdoor Recreation

Response:

Stipulation "(I)" is still valid in cases where steps can be taken by the lessee to permit continued use of the Osceola Trail during mining operations. If trail use is prevented or unreasonably disrupted, Stipulation "(J)" requires lessee to relocate the trail where needed as determined by the Authorized Officer. In either case, this would constitute an unavoidable impact. Section V has been revised to include this impact.

Issue n:

The Draft Environmental Impact Statement does not contain an economic analysis of the benefits of the proposed phosphate mining versus the benefits of retaining the present uses and productivity of the Osceola National Forest. It is contended that this significant omission will not permit the Secretary of the Interior to determine if a "valuable mineral deposit" (30 U.S.C. 211, Section 9, Mineral Leasing Act for Acquired Lands 30 U.S.C. 351-399) has been discovered until these comparative data have been provided.

Issue Raised By:

- U.S.D.I., Bureau of Sport Fisheries and Wildlife
- U.S.D.A., Forest Service
- U.S. Environmental Protection Agency, Region IV
- State of Florida, Department of Agriculture and Consumer Services
- North Central Florida Regional Planning Council
- Alachua Audubon Society
- Environmental Action Group
- Florida Audubon Society
- Florida Defenders of the Environment
- Izaak Walton League, Indiana Division
- S.E. Lumber Manufacturers Association
- Society of American Foresters
- Wildlife Management Institute
- Kerr-McGee Corporation
- University of Oklahoma
- and several individuals

Response:

U.S. Department of Interior policy provides for the development and review of Environmental Impact Statements in compliance with the National Environmental Policy Act of 1969. Such statements are limited to the environmental aspects of proposed Federal actions and generally do not contain related policy, program, economic, or other significant non-environmental information which may be of importance in the decision-making process.

Interior policy further provides for the development of a Program Decision Option Document (PDOD) for the use of the Secretary in matters where there are substantial policy questions involved. The PDOD addresses economic, social, and other non-environmental aspects of the decision facing the Secretary as well as alternate courses of action. Preparation of the PDOD is often started during the time the Draft Environmental Statement is being reviewed and, whenever feasible, is submitted to the Secretary before the final Environmental Statement is transmitted to the Council on Environmental Quality.

This procedure is designed to ensure timely and systematic consideration of all environmental, program, economic, social, and other aspects of critical decisions.

Issue o:

One of the lease applicants contends that the location of their lease application renders invalid certain assumptions and portrayal of environmental impacts described in the statement. The applicant desires individual treatment of their lease applications.

Issue Raised By:

--Kerr-McGee Corporation

Response:

The degree of environmental impacts caused by one operation may or may not be proportional to the impacts realized on the total lease area. Similarly stated, ore mining operation conducted by each lease applicant could cause like or unlike environmental impacts on a fraction of the total lease area. Likewise two or more independently conducted mining operations could cause cumulative environmental impacts of the same magnitude as one collective mining operation. Rather than prepare statements for each lease applicant the impacts of 41 lease applications have been considered under one statement. Furthermore, the Council on Environmental Quality Guidelines on preparation of Environmental Impact Statements state, in part, (1500.6a): "...major Federal actions significantly affecting the quality of human environment is to be construed by agencies with a view to the overall, cumulative impact of the action proposed, related Federal actions and projects in the area, and further actions contemplated."

Issue p:

The Draft Environmental Impact Statement failed to consider the possibility that one or more plant facilities will be located within the Osceola National Forest rather than on private land.

Issue Raised By:

--Global Exploration and Development Corporation

Response:

Under Assumptions, page 10, paragraph 1(a), it states that plants, tailings, and slime ponds would be located off the forest by the terms and conditions of the lease. Also, plants located on private lands is based on information in the interrogatories furnished by some of the lease applicants. For example: Kerr-McGee stated "the location of a beneficiation plant has not been selected, since that determination can be made only after extensive development drilling and formulation of mining plans." Kerr-McGee further indicated that a plant would be located west and outside of the Osceola National Forest.

In a letter to the Bureau of Land Management dated September 22, 1972, Monsanto Commercial Products Co. remarked, "Presently there are no plans to locate a plant or any plant tailings on forest lands." And in the interrogatories, "the exact location of a beneficiation plant to process matrix mined from the Osceola National Forest has not been determined; however, Monsanto contemplates no beneficiation plant on the Forest."

Replying to a Bureau of Land Management request for general information, Global Exploration and Development Corporation stated in a letter dated December 18, 1971, "Proper reclamation of mined areas will require two mines due to limitations imposed by economic pumping distances. It would appear commercial production of phosphate rock within the Osceola National Forest could be feasible by 1975 based on the ability of the four companies involved to combine reserves for support of economical mine sites on an equitable basis."

Kerr-McGee Corporation and Monsanto Commercial Products Co. clearly state that plants are not planned or anticipated to be located on the Forest. Global Exploration and Development Corporation has not stated where plant locations are anticipated.

If leases are issued, the terms and conditions of the lease would not permit construction of buildings, plants, and facilities on the Forest.

Issue q:

The alternative described in the statement which would deny the leases or require the Secretary to take no action on them is not consonant with applicable legal and constitutional requirements. Kerr-McGee contends that the lease applicants have established legal rights to leases under provisions of the mineral leasing laws.

Issue Raised By:

--Kerr-McGee Corporation

--Global Exploration and Development Corporation

Response:

CEQ guidelines provide that all viable alternatives to the proposed action be considered. Within the scope of these guidelines, the statement recognizes that the alternatives raise legal questions which may have to be resolved through the judicial or legislative process.

Issue r:

The phosphate deposits within the Osceola National Forest should be kept in reserve and developed only in the event of a domestic crisis for which no other alternatives are available. In the meantime, the environmental values associated with the forest will be preserved and production of renewable resources will continue.

Issue Raised By:

--U.S.D.A., Forest Service

--U.S. Environmental Protection Agency, Region IV

--Attorney General, State of Florida

--Florida Audubon Society

--Izaak Walton League - Indiana Division

--S.E. Lumber Manufacturers Association

--Suwannee River Authority

--Suwannee River Citizen's Association

--Honorable William Lehman, M.C., Thirteenth District, Florida

--Stetson University

Response:

This possibility has been incorporated in Alternative B-3 (Section VIII).

Issue s:

Expand the alternative, "Leasing with delayed authorizaiton to mine," to incorporate a requirement that applicants demonstrate ability to accomplish acceptable restoration techniques on comparable private land as a prerequisite to authorizaiton of mining on National Forest Land.

Issue Raised By:

--U.S.D.A., Forest Service

Response:

Alternative B-3 has been expanded to include this requirement.

Issue t:

The Draft Environmental Impact Statement does not provide sufficient detail concerning alternate sources of phosphate or the reduction in the use of phosphates.

Issue Raised By:

--U.S.D.A., Forest Service
--State of Florida, Department of Agriculture and Consumer Services
--Alachua Audubon Society
--Izaak Walton League - Indiana Division
--Sierra Club; Florida Chapter
--Honorable William Gunter, M.C., Fifth District Florida
--and two individuals

Response:

Available information has been incorporated into the statement. Alternate sources of phosphate are related to the location and development of other deposits, reduction of consumption, and recycling of phosphorus bearing wastes.

The principal sources of phosphate at present occur in Florida, North Carolina, Tennessee, and the Rocky Mountain area. Of the 40 million (plus) tons of phosphate produced (annually) domestically, nearly 83 percent is derived from Florida and North Carolina deposits (Section I, Figure 5). Because of quantity, quality, and accessability, the Florida phosphate deposits are a major contributor to domestic and foreign markets. Projected demand indicates that this trend will continue until 1980-85 when most of Florida's phosphate deposits will have been mined.

It is probable that optimum applications of phosphorus could be established for specific crops. With adequate monitoring this may reduce per unit phosphorus fertilizer consumption. The increasing demand for food and fiber is expected to increase the total demand for phosphates.

Additional inquiries and investigations were made by team members concerning recycling of animal and human wastes. Several studies have evaluated this possibility. As indicated by the attached graph, the basic resource, phosphorus, does exist in significant quantity. This phosphorus source, however, is widely dispersed in the United States. Problems in collection and transportation of these wastes make recycling expensive at this time.

Feasibility studies have been made of recovering phosphorus from sewage treatment plants. Phosphorus

contributions from this source, regardless of recovery costs, would supply only a small percent of the U.S. phosphorus demand. The recovery of phosphorus from sewage is dependent upon the development of tertiary sewage treatment facilities. When and if this stage of sewage treatment becomes a reality, phosphorus could become available for industrial and agricultural uses.

Since the beginning of the flotation system of processing matrix, approximately 1.5 billion tons of slimes (wet weight) have been stored in the Florida phosphate fields. These slimes cover nearly 50,000 surface acres.

Assuming that active slimes average 20 percent solids, this would indicate approximately 290 million tons of slime solids. Of these solids, 12 percent (approx. average) or 35 million tons is phosphate (P₂O₅). According to the Project Director, Florida Phosphatic Clays Research Project, this 35 million tons represents the phosphate (P₂O₅) resource in active and uncommitted (to some other land use) slime settling ponds. The upper limit of this phosphate resource may approach 45 million tons.

As stated in the text of the statement (Section VIII-D-6), reprocessing of existing slime ponds has been uneconomical to date due to technical difficulties, however, increases in phosphate prices indicates that this source will probably be tapped.

Present knowledge concerning the distribution of offshore phosphate nodules indicate that only a small percentage are concentrated in deposits that may be considered as potential resources. These deposits are located off the southern California Coast and pending further delineation and evaluation, these deposits must be treated as submarginal.
1/

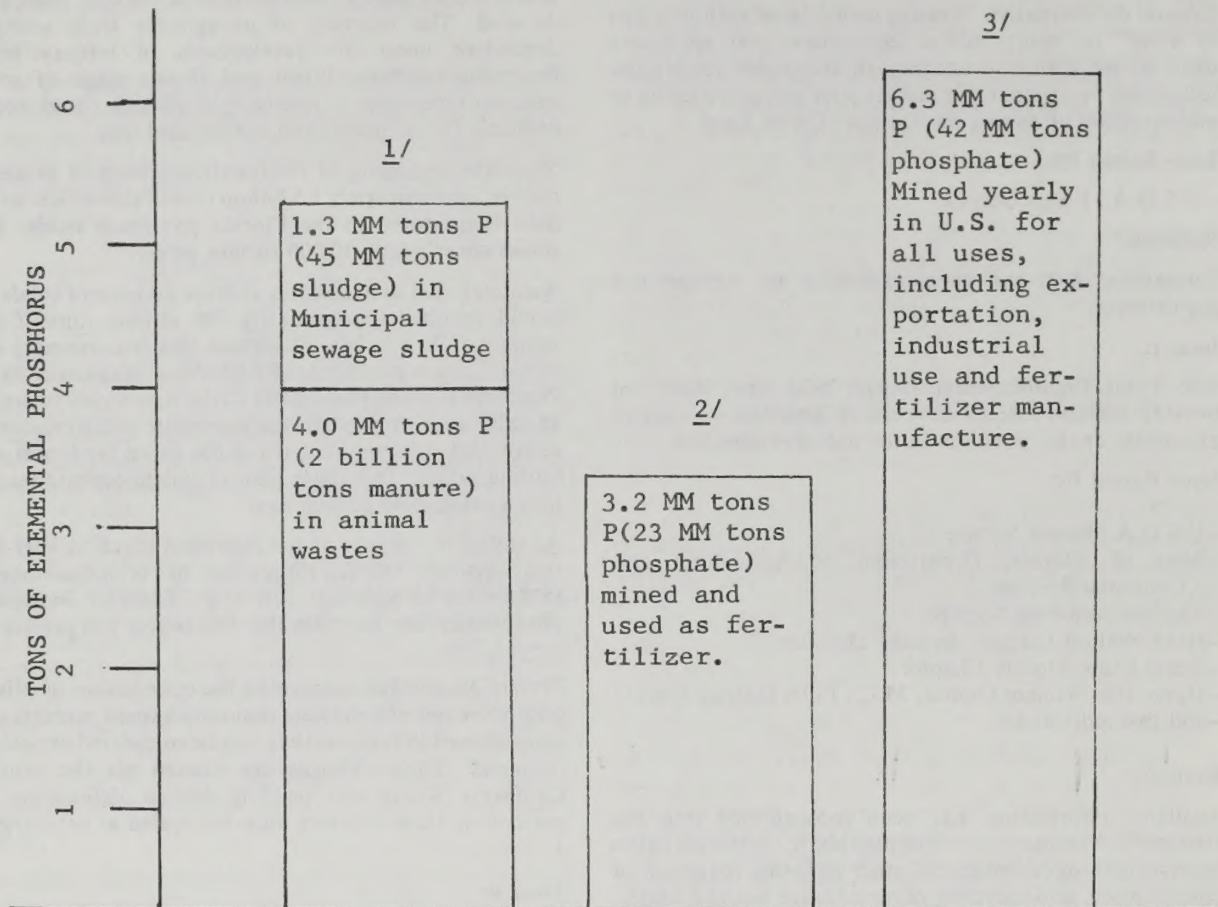
Issue u:

"A Supply and Demand Forecast" needs to be clarified and expanded to relate quantity of reserves on the Osceola National Forest with reserves in the rest of Florida, as well as regionally, nationally and worldwide.

Issue Raised By:

--U.S.D.I., Bureau of Outdoor Recreation
--U.S.D.A., Forest Service
--Attorney General, State of Florida
--State of Florida, Department of Administration - Office of the Secretary
--State of Florida, Department of Agriculture and Consumer Services
--State of Florida, Division of Forestry
--Alachua Audubon Society
--Environmental Action Group
--Florida Defenders of the Environment, Inc.
--Florida Trail Association
--Sierra Club, Florida Chapter
--Society of American Foresters
--Honorable Bill Gunter, M.C., Fifth District, Florida

1/ Draft Environmental Statement, U.S.D.I., Bureau of Land Management, Proposed Outer Continental Shelf Hard Mineral Mining Operating and Leasing Regulations.



Annual phosphorus tonnage in municipal sludge, animal wastes and mined rock phosphate.

1. Peterson, J. R.; McCalla, T. M.; and Smith, George E. 1971. Human and Animal Wastes as Fertilizers. In Fertilizer Technology and Use, 2nd ed., p. 557-596. Soil Science Society of America, Madison, Wisconsin.
2. 1972 Bureau of Mines Minerals on Phosphate Rock, U.S. Department of the Interior

--Honorable William Lehman, M.C., Thirteenth District,
Florida
--and one individual

Response:

Reserves of marketable phosphate rock at various 1973 price levels were estimated for the United States (Section I, Conclusions). At \$8.05 per short ton, the 120 million tons of phosphate reserves on the Osceola National Forest represents 10 percent of the 1.2 billion tons of known reserves in Florida, or approximately 6 percent of the United States reserves.

National and worldwide identified and undiscovered phosphate resources will continue to change the known reserves of marketable phosphate rock. The need and demands for phosphate fertilizers will have significant economic implications on the discovery and mining of national and worldwide deposits of phosphate rock. Section I-D was based on available supply and demand data compiled by the U.S. Bureau of Mines.

Issue v:

The Draft Environmental Statement does not adequately discuss the impact to the wiregrass community by surface mining.

Issue Raised By:

--Sierra Club, Florida Chapter

Response:

An unpublished study by Roger T. Parrott, "A Study of Wiregrass (*artistida stricta michx*) with Particular Reference to Fire," was conducted for a Masters thesis at Duke University in 1967.

The study reveals that wiregrass produces viable seed infrequently and then only in certain areas. The mechanisms that trigger viable reproduction are not known. Botanists have observed that when wiregrass is eliminated through tilling, it does not reestablish when tillage ceases, even on areas adjacent to undisturbed wiregrass cover.

The potential impact to the wiregrass community has been included in Section VII-E of the final environmental impact statement.

Issue w:

The draft statement does not discuss the economic value of the fisheries resource of the Suwannee River as related to adverse impacts that would occur from slime pit disasters.

Issue Raised By:

--Florida Game and Fresh Water Commission

Response:

A discussion of the economic value of the fisheries resource subject to impact has been included in Section III of the final environmental impact statement.

Issue x:

The draft environmental statement does not adequately discuss adverse impacts to endangered species.

- (1) The final environmental impact statement should acknowledge the increased responsibility and

requirements of the "Endangered Species Act of 1973" which became law *after* the draft was circulated for comment.

- (2) Species considered endangered by the State of Florida should be discussed more fully.
- (3) Several respondents confused the categories of "endangered" and "threatened" in the text.

Issue Raised By:

--U.S.D.I., Bureau of Sport Fisheries and Wildlife
--Florida Game and Fresh Water Commission
--Izaak Walton League - Indiana Division
--National Wildlife Federation
--Honorable William Lehman, M.C., Thirteenth District,
Florida

Response:

Section II-B-2 of final environmental impact statement includes changes to cover (a) responsibilities under the 1973 Act, (b) information of Florida's list of endangered species, and (c) clarification of terms.

Issue y(1)

Approval of the action under consideration would be in direct violation of certain provisions of:

The National Environmental Policy Act as well as:
The Weeks Act of 1911 under which the National
Forests were acquired and managed
The Multiple Use and Sustained Yield Act of 1960
The Endangered Species Conservation Act of 1973

Issue Raised By:

--Honorable Lawton Chiles, U.S. Senator, Florida
--Honorable Jay Landers, Assistant to the Governor of
Florida
--Attorney General, State of Florida
--State of Florida, Department of Administration
--State of Florida, Department of Transportation
--Florida Audubon Society
--Florida Defenders of the Environment, Inc.
--Izaak Walton League - Indiana Division
--Society of American Foresters
--and one individual

Response:

The authorities and responsibilities of the Secretaries of Agriculture and the Interior are expressed in a large number of statutes. By and large, the Congress has recognized that some of the objectives in these laws are in conflict with each other and has given the Secretaries guidelines and some measure of discretion to resolve the conflicts.

For example, leasing of the phosphate deposits in the Osceola National Forest is authorized by the Acquired Lands Mineral Leasing Act of 1947 (30 U.S.C. 351-359). Development of the deposits, however, is "...subject to such conditions as [the Secretary of Agriculture] may prescribe to insure the adequate utilization of the lands for the primary purposes for which they have been acquired or are being administered. . ." (30 U.S.C. 352)

Similarly, the National Environmental Policy Act stresses the preservation and enhancement of the quality of the

human environment. It directs Federal agencies to carry out policies to this end as long as they are "...consistent with other essential considerations of national policy. . ."

A further example appears in the Multiple Use and Sustained Yield Act of 1960 (16 U.S.C. 528). That law establishes that it is the policy of Congress that the national forests be administered for outdoor recreation, range, timber, watershed, and wildlife and fish purposes." But, it also specifically provides that "...Nothing herein shall be construed so as to affect the use and administration of the mineral resources of the national forest lands. . ."

Thus, while it is true that issuance of leases may appear to be in "direct violation" of certain provisions of various laws, these laws must be read in their entirety and with reference to each other to determine the will of Congress.

In making his decision with respect to the Osceola applications, the Secretary will take into consideration all relevant law.

Issue y(2):

Lease Applicants have established legal rights to leases under provisions of the Mineral Leasing Act.

Issue Raised By:

--Kerr-McGee Corporation

Response:

These points will be considered and discussed in the Program Decision Option Document (PDOD).

Issue z:

To the extent that the statement depicts environmental consequences of phosphate development on lands other than the forest lands, the statement goes beyond the purview of the dictates of the National Environmental Policy Act of 1969.

Issue Raised By:

--Kerr-McGee Corporation

Response:

It is not entirely clear whether this issue has reference to environmental consequences of developing phosphate deposits located on private land, or to the environmental consequences that development of Federal phosphate deposits may have on private land.

The statement does not assess environmental impacts of developing privately owned phosphate deposits. It is, however, within the purview of the National Environmental Policy Act to assess environmental impacts on privately owned lands that may result from mining federally owned deposits. Deposit of slimes on private lands as a result of mining on Federal lands is a clear example of a direct impact which must be considered not only in determining the need for an environmental statement, but also in the statement itself.

Furthermore, if the action fosters accelerated population growth which in turn causes secondary effects upon the resource base, including land use, water, and public services of the area in question, such factors must be considered in the environmental impact statement.

Issue aa:

More emphasis should be given to potential impacts on private lands outside the Forest as a result of mining phosphate on the National Forest.

Issue Raised By:

--U.S.D.A., Forest Service

--Florida Audubon Society

--Izaak Walton League - Indiana Division

Response:

At this time, it is not possible to accurately identify the specific locations of processing facilities and slime storage areas. Where specific locations could not be determined, identification and description of impacts had to be covered in a more general manner.

It should be noted that impacts that could occur as a result of mining, including beneficiation, acidulation, and slime storage, are described in detail in Section III of the statement. These impacts are applicable to the Forest as well as private lands along the western boundary of the Forest.

Should the leases be issued, the companies would be required to submit detailed and comprehensive mining and reclamation plans. At this time, mitigating measures and stipulations, as discussed in Section IV, would be tailored and incorporated to fit specific mining activity locations and conditions.

Issue bb:

Will the electric power requirement (estimated 400 million kwh/yr) for mining operation of the assumed magnitude place excessive demands on existing power supplies?

Issue Raised By:

--U.S. Environmental Protection Agency, Region IV

--Attorney General, State of Florida

--Environmental Action Group

--and two individuals

Response:

Impacts associated with electrical power transmission and distribution are discussed in Section III. This section points out that additional power supplies will be necessary to avoid the possibility of local and regional brown-outs and black-outs with consequent social and economic impacts. A portion of the additional power required will be produced by the operator. Additional power will be required of external sources.

Mitigating measures pertinent to impacts are discussed in Section IV E stipulations.

Issue cc:

The Draft Environmental Statement does not adequately cover past history or discuss future possibilities of slime dam failures, especially with concern to the Suwannee River, Santa Fe River, and Ocean Pond.

Issue Raised By:

--Attorney General, State of Florida

--Florida Game and Fresh Water Commission

--Environmental Action Group

--Sierra Club, Florida Chapter
--and several individuals

Response:

(a) Past slime dam failures

Since the Draft Environmental Impact Statement was written, we have obtained additional information regarding slime breaks in central Florida. The date is now included in the final Environmental Impact Statement.

(b) Future slime dam failures

The Environmental Impact Statement states that it is difficult to predict dam failures. Slime dams in northern Florida are lower in height, usually contain less slime, and have less pressure as compared with those in Central Florida. The Environmental Impact Statement has made stipulations for double-diking around slime ponds, maintenance, and adherence to State laws. Appendix 9 deals with the State of Florida rules for earthen dams specific to phosphate mining and processing. These rules, revised December 8, 1972, addresses not only new dams but active and retired dams.

Available data is inadequate to assess the exact cause(s) of past slime dam failures. thus, it is difficult to draw any substantial quantitative conclusions on the probability of a future dam break. The Draft Environmental Impact Statement points out that the slime dams pose a threat to downstream areas. This will exist as long as dams are utilized to contain slimes.

In addition, the issue dealing with "above ground dikes. . ." describes a proposed system that may minimize the need for slime ponds. If the mining leases are issued, a waste disposal system, similar to the "Brewster" system, may be utilized. (See Issue a).

The Draft Environmental Impact Statement discusses the possible impacts of spills to the Suwannee. There are no mineable deposits of phosphate on the National Forest within the Santa Fe drainage. Drainage is away from Ocean Pond which would not be threatened by slime dam failures from the mineable areas on the National Forest.

Issue dd:

The first fifteen pages of the draft Environmental Impact Statement were poorly written and did not adequately identify and make distinction as to the responsibilities of the U.S. Forest Service, Bureau of Land Management, and Geological Survey with regard to the proposed action nor to the various mineral leasing acts affecting the proposal.

Issue Raised By:

--U.S. Geological Survey

Response:

Section I of the final Environmental Impact Statement has been reviewed and edited. Essentially, the content of the draft statement remains intact. Material was, however, rearranged and where necessary expanded or deleted to clarify or qualify the responsibilities of the Forest Service, Bureau of Land Management, and Geological Survey. A copy of Title 30 C.F.R. Part 231 (Operating Instructions for Exploration, Development and Production) has been included as Appendix 16.

Issue ee:

The Draft Environmental Impact Statement underestimates the disruption to natural systems and overestimates effectiveness of mitigation measures with regard to wildlife habitats.

Issue Raised By:

--U.S.D.I., Bureau of Sport Fisheries and Wildlife
--Wildlife Management Institute

Response:

The following cited sections of the statement address the severity of anticipated impacts to the fish and wildlife resources:

A. Natural swamp systems - Section III, Ecological Interrelationships: Section III-B-1-Vegetation; Section III-B-2-Wildlife and Fisheries

B. Endangered species - Section III-B-2-Wildlife and Fisheries, Threatened Species.

The mitigation portion (Section IV) of the statement makes no claim of habitat restoration for endangered species or complex communities. Primary mitigating measures are aimed at preserving portions of critical habitats such as highly sensitive areas (Section II-E). Section VII discusses irreversible and irretrievable commitment of resources associated with natural swamp systems, endangered species, and fish and wildlife habitats.

7. Written Comments

Written comments from Federal/State agencies, organizations, and individuals possessing special expertise are indexed and included in the following pages.

A number of letters were received from school children and other individuals which expressed views on the action under consideration. Since these letters did not address the substance of the draft environmental impact statement, they were not included in the final statement. The Secretary of the Interior, however, will consider the views offered by these and all other letters and oral comments in making his final decision concerning the issuance of the phosphate preference right leases.

All written comments received in review of the draft statement are on file and are available for public review at:

Eastern States Office
Bureau of Land Management
7981 Eastern Avenue
Silver Spring, Maryland 20910

TABLE OF CONTENTS

Written Comments

Respondent	Page
USDI - Bureau of Mines	IX-15
USDI - Bureau of Outdoor Recreation	IX-16
USDI - Bureau of Sport Fisheries and Wildlife	IX-20
USDI - Geological Survey	IX-22
USDA - Forest Service	IX-24
USDA - Soil Conservation Service	IX-29
U.S. Environmental Protection Agency - Region IV	IX-30
Florida Department of Administration - Office of the Secretary	IX-43
Florida Department of Administration - Division of State Planning	IX-47
Florida Department of Agriculture and Consumer Services	IX-52
Florida Board of Trustees of the Internal Improvement Trust Fund	IX-55
Florida Department of Community Affairs -Division of Technical Services.....	IX-57
Florida Game and Fresh Water Fish Commission	IX-58
Florida Department of Natural Resources - Division of Recreation and Parks	IX-61
Florida Department of Natural Resources - Division of Interior Resources	IX-63
Florida Department of State	IX-64
Florida Department of Pollution Control	IX-65
Florida Department of Transportation	IX-67
Florida Department of Health and Rehabilitative Services	IX-69
Florida Department of Agriculture and Consumer Services - Division of Forestry.....	IX-75
North Central Florida Regional Planning Council	IX-77
Alachua Audubon Society	IX-80
Environmental Action Group	IX-83
Florida Defenders of the Environment, Inc.	IX-85
Florida Foundation for Future Scientists	IX-89
Florida Trail Association	IX-91
Florida Wildlife Federation	IX-92
Izaak Walton League - Indiana Division.....	IX-94
National Wildlife Federation	IX-100
Sierra Club - Florida Chapter	IX-102
Southeastern Lumber Manufacturers Association	IX-104
Suwannee River Citizens Association	IX-108
Wildlife Management Institute	IX-110
Agrico	IX-112
Andco Environmental Processes, Inc.	IX-115
Global Exploration and Development Corp.	IX-116
Kerr-McGee Corporation	IX-119
Stetson University - Department of Biology	IX-129
Stetson University - Department of Biology	IX-130
University of Florida - College of Engineering	IX-131
University of Oklahoma - Biological Survey	IX-149
Hon. Bill Gunter, M.C., Fifth District, Florida	IX-162
Hon. William Lehman, M.C., Thirteenth Dist., Florida.....	IX-167
Sedmera, Frank	IX-171



United States Department of the Interior

BUREAU OF MINES
WASHINGTON, D.C. 20240

January 9, 1974

Memorandum

To: Director, Eastern States Office, Bureau of Land Management,
Silver Spring, Maryland

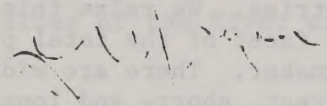
Through: ~~Deputy~~ Assistant Secretary--Energy and Minerals

From: Director, Bureau of Mines

Subject: Draft environmental statement, Bureau of Land Management,
Phosphate Leasing on the Osceola National Forest, Florida

We have reviewed this draft environmental statement from the standpoint of adequacy of those sections covering mining and processing of phosphates and the reclamation of mined areas. As you know, the Bureau's representative on the Departmental team wrote and approved the sections within our area of concern and submitted lengthy comments on the whole of earlier versions.

We have no further comments to make.


Assistant Director



United States Department of the Interior

BUREAU OF OUTDOOR RECREATION
WASHINGTON, D.C. 20240

IN REPLY REFER TO:

DES-73/79

Memorandum

To: Director, Eastern States Office, Bureau of Land Management,
7981 Eastern Avenue, Silver Spring, Maryland 20910

From: Director, Bureau of Outdoor Recreation

Subject: Comments on draft environmental impact statement, Phosphate
Mining on the Osceola National Forest, Florida

We have reviewed the subject draft environmental statement as requested in Mr. Paul D. Leonard's letter which was received in this Bureau on December 18, 1973. Our comments are arranged generally according to the format of the statement.

Pages I-15 - I-22: This section presents a description of phosphate production and consumption as well as a national supply and demand forecast. While the discussion of domestic use seems adequate, the matter of the export situation (especially as it may relate to phosphate mined at this project) appears to us to be inadequate. In our view, the final statement should address fully the question of whether or not the phosphate mined on the National Forest will be channeled to domestic or foreign markets; if to foreign markets, then to which country or countries. We raise this point because, in our view, it is an important facet of the total picture which should be considered by the decisionmaker. There are wide-ranging and potentially serious direct and indirect, short- and long-term environmental impacts associated with this proposal. If mining takes place, a domestic environmental "price" of substantial proportions will have to be paid. Under such a set of circumstances, it makes a difference whether a domestic or foreign user receives the benefits of this production.

Page II-77: Under the subheading, "Wildlife and Fisheries," the statement indicates that, "Each year more and more visitors come to the Osceola National Forest for wildlife observation, nature study, and outdoor experiences away from urban areas." In addition to the recreation use data presented on page II-87, a table or graph quantifying the increasing public use of the Forest for outdoor recreation activities should be presented in the final statement.

Page II-86: The Osceola Trail, a part of the designated Florida Trail, is mentioned for the first time on this page. About nine miles of the Osceola Trail falls within the lease area. "Much of the western section of the Osceola Trail . . . " will be destroyed as a result of phosphate mining (page III-37). We view the Osceola Trail as a valuable recreation resource. On page IV-27, stipulations "(I)" and "(J)" provide for, among other things, public use and access to existing "foot trails" and "trails" respectively. Since we know that a portion of the existing Osceola Trail will be destroyed by mining, it appears that the lessee cannot comply with stipulations "(I)" and "(J)." The integrity of the eventual 700-mile-long Florida Trail is partially dependent on preserving the integrity of the existing Osceola Trail. In addition to clarifying the apparent problem mentioned above relating to the stipulations, we recommend a new stipulation relating wholly to the continued existence of the Osceola Trail. It should require the lessee to replace, both in equal quantity and quality, at the lessee's cost, every foot of the Trail which is destroyed or otherwise adversely impacted by mining or mining-related activities.

Pages II-20 - II-55: The Osceola National Forest is contained within the Suwannee and St. Marys River Basins. On page II-23, it is stated that, "The Suwannee River is a proposed Wild and Scenic River." This is a possibly misleading statement. The reference to the Suwannee on page II-102 is more accurate. Section 5(a) of the Wild and Scenic Rivers Act (P.L. 90-542) designated the Suwannee River for study as a potential addition to the National Wild and Scenic Rivers System. A study of the River, under the leadership of this Bureau, has been underway for some time and is now approaching completion. Preliminary findings indicate that the River meets the established criteria for formal designation as a component of a wild and scenic river system. However, no final proposal for incorporation of the River in a system has yet been made. It is clear, in any event, that the Suwannee River possesses unique qualities which warrant careful protection and preservation. In this regard, we urge, in the event mining leases are issued, that extreme care be exercised to assure that the present unusual values of the River are not degraded in any manner.

Page III-12: This page is a repetition of page III-11.

Page III-37: The authors estimate that there will be a 25 percent reduction in available recreation opportunities (other than hunting where a 30 percent loss will occur) as a result of mining. Since recreation use of the Forest is increasing (see page II-77), the final statement should indicate what steps will be taken, and by whom, to offset the loss and to meet the increasing recreation demand.

Page III-38: The second paragraph consists of speculative statements regarding what might be done with the increased surface water available

for recreation development once mining is completed. While such expressions of what could be done are appropriate, we would prefer to see commitments made as to what will be done to meet present and anticipated recreation demand on the Forest. This same comment would be appropriate to page IV-7, first sentence under, "Watershed, Hydrology, Quality."

Page IV-19: One measure mentioned as a mitigation to the loss of recreation opportunities is to plan land reclamation practices as soon as possible, but no later than one year after mining is completed. In our view, in order to implement a concurrent mining-reclamation program, plans for reclamation and decisions as to the end uses of the land following reclamation should be finalized before or shortly after mining commences. Such planning maximizes use of equipment while on-site, saves the operator money, and returns the land to some other use with minimum loss of time. Reference to initiation of actual land reclamation activities as much as a year after completion of mining is found on page IV-40. We see no need for a lag time of as much as a year after mining before land reclamation begins. We believe that the leases, if they are awarded, should require the initiation of land reclamation practices no later than 90 days after mining is completed in order to take advantage of available equipment and to quickly return the land to productive use.

Page IV-35: We note that the stipulations use the word "shall." They thus constitute conditions which must be met by the lessee before he will receive the lease. In the second paragraph, under "Disturbance of Existing Waters," however, it states, "The quality and quantity of water from the Floridan Aquifer should be" Because of the importance of the Floridan Aquifer, we believe the word "should" should be replaced by "shall."

Page IV-39: The second full sentence at the top of the page reads, "Seeding and planting shall be repeated if prior attempts to revegetate are unsuccessful." It would be appropriate, we believe, to set some limit on the number of times the lessee will be required to reseed and replant.

Page V-2: The final paragraph constitutes a judgment that the conversion of one-third of the mined area from land to water is an adverse impact which cannot be avoided. From our viewpoint, where new water oriented recreation opportunities will probably come into being, the creation of new water areas would be classed as a beneficial impact. The same observation holds for the last sentence in paragraph one, page V-5.

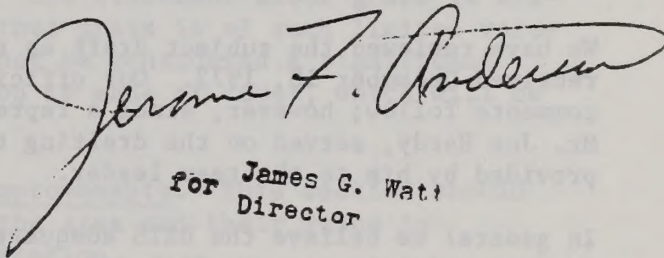
Page V-8: Item 5 on this page is a discussion of unavoidable adverse impacts of mining on recreation. There should be a discussion here of the impacts of mining as they relate to the Osceola Trail. At least

two aspects should be addressed: (a) destruction of a portion of the Trail and the need for replacement in kind and quality to preserve its integrity, and (b) curtailment or prohibition of Trail use during the mining and Trail relocation periods.

Page VI-6: This page should include a discussion of the short-term use of the lease area for mining vs the short- and long-term use and value of the Osceola Trail.

Page VIII-1 and following: This section deals with the alternatives to issuance of the preference right leases. After careful review of the draft environmental statement, and especially in view of the lack of land reclamation experience on large tracts of phosphate-mined land in northern Florida (see page I-25), we would recommend, if asked, a "go slow" approach. This seems best stated as alternative two, "Selective Leasing to Protect Sensitive Areas" (pages VIII-2 - VIII-3).

We appreciate the opportunity of reviewing and commenting on the draft environmental impact statement.


for James G. Watt
Director



UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE

ADDRESS ONLY THE DIRECTOR,
BUREAU OF SPORT FISHERIES
AND WILDLIFE

In Reply Refer To: WASHINGTON, D.C. 20240
FSF/SQ
DES73/79

Memorandum

To: Director, Eastern States Office, Bureau of Land Management
Silver Spring, Maryland

From: Associate
Director, Bureau of Sport Fisheries and Wildlife

Subject: Comments on Draft Environmental Impact Statement -
Phosphate Leasing on the Osceola National Forest, Florida
(ER-73/79)

We have reviewed the subject draft as requested in your letter received December 18, 1973. Our official Bureau field review comments follow; however, since a representative of our Bureau, Mr. Joe Hardy, served on the drafting team additional input will be provided by him to the team leader.

In general we believe the DEIS adequately addresses major concerns for potential impacts to fish and wildlife resources of the area. The final EIS could be strengthened by further consideration and elaboration on the following points:

On page I-26 the statement estimates that 750 to 1,000 acres will be mined per year over a 30-year period. Page III-14 assumes that 750-1,000 acres would be denuded of vegetation at all times. This would mean that a mined area would be revegetated within a year. This is a highly optimistic.

Section III B(2). A major deficiency in this section is the failure to include the effects on endangered species as listed by the State of Florida. There should be a discussion of those species listed by the State although they may not be listed in the "Red Book." Species possibly associated with the Osceola National Forest and listed as endangered by the State include the indigo snake, wood ibis, Florida weasel and American peregrine falcon. A major rewrite for portions of the DEIS relating to threatened species will be required to provide consideration of the "Endangered Species Act of 1973" which became law on December 29, 1973. The Bureau of Sport Fisheries and Wildlife representative to the interagency EIS writing team will coordinate appropriate input for this revision.

Page III-18. If dewatering reduced the quality of ground water in shallow aquifers this in turn would affect vegetative types, possibly some distance from the actual mining operation. Thus, impacts could result to wildlife habitat and associated species of animals, i.e., the wood ibis mentioned on page IV-16. The possibility of such secondary impacts should be thoroughly investigated and discussed.

Page IV-2. In the section of geology the statement says "The geologic and mineralogic rearrangement will result in no geologic hazards of physical nature such as landslides or land subsidence, or chemical hazards to the surrounding environment." Earlier in the statement (page III-20) it reads "The decline in artesian pressure could induce development of additional sinkholes in the area." This apparent discrepancy should be clarified.

On page IV-16 the statement is made "Loss of the original habitat and types of feed for the deer and bear populations would occur as a result of mining. However, for deer this loss can be partially mitigated with grass which should be seeded immediately after an area is disturbed or mined." The statement about grass is misleading. Deer are browsers thus grass is of such limited value in this area that it should not be considered a significant mitigating action. No mention is made of cover, which will be as important as food.

Page V-9,6. Land Uses and Improvements. This section should discuss the loss of bees to the area and their value in pollination of remaining vegetation.

We appreciate the opportunity for this review, and hope that these comments will provide additional information for strengthening the final statement.

Kenneth E. Black



United States Department of the Interior

GEOLOGICAL SURVEY
RESTON, VIRGINIA 22092

OFFICE OF THE DIRECTOR

DES 73/79

MAR 8 1974

Memorandum

To: Director, Bureau of Land Management

Through: ^{Acting} Deputy Assistant Secretary--Energy and Minerals

From: Director, Geological Survey

Subject: Review of draft environmental impact statement on proposed phosphate leasing on the Osceola National Forest

We have reviewed the subject draft environmental statement.

We believe the statement considers the potential impacts of the proposed action on water resources and related aspects of the environment. Our suggestions on a previous informal working draft have been incorporated in this formal draft statement.

The first 15 pages of the draft statement are poorly written and do not reflect adequate identification and distinction of the responsibilities of the Forest Service, Bureau of Land Management, and the Geological Survey with regard to the proposed action nor to the various mineral leasing acts affecting the proposal.

Page III-34, "Mechanical and hand planting methods will be hindered by the steep and rough topography. Steep slopes may restrict intermediate thinnings, thus limiting tree growth and quality."

These words are incompatible with pictures of reclaimed lands shown earlier in the text or the fact that uses of reclaimed land include golf courses, citrus groves, truck farms, subdivisions, etc. (p. I-40). Further, such language suggests that grading of spoil piles is not anticipated or required.

Also on this page are statements concerning the unlikelihood of "natural recovery of grazing values" and "natural regeneration" of timber capacity. This section should be restricted to a discussion of the impacts of mining. Rehabilitation should be discussed under "Mitigating Measures." No approved mining plan would permit only "natural recovery" or "natural regeneration."

Page IV-3, subsection b: Reclamation procedures should be amplified to include the new techniques that are now being developed and used in the central Florida land pebble phosphate field by Poseidon Mines, Inc., Kerr-McGee, and American Cyanamid. The phosphate producing companies should be canvassed by the Bureau of Land Management to ascertain the rate that lands mined for phosphate are presently being reclaimed in Florida, including the total acreage being restored.

Page IV-4, "The lessee would be required to prepare a reclamation plan to be approved by the Forest Service."

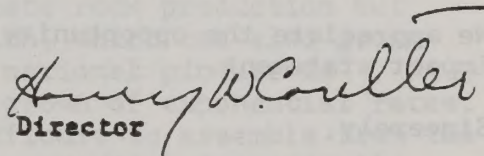
See 43 CFR 28.8 (Appendix). Also, see IV-23, "Authorized Officer." Page I-9 points out that the Geological Survey supervises mining and these inconsistencies should be corrected accordingly.

There are several references throughout the text to impacts resulting from slime ponds and disposal of sand tailings. At least one company (American Cyanamid) has successfully mixed sand and slimes to produce land surface having good bearing strength (p. I-45). This technique should be fully discussed and considered under "Mitigating Measures." A mining plan will not be approved by the Geological Survey which does not incorporate the latest available technology for rehabilitating mined lands.

A copy of the attached 30 CFR 231, the Geological Survey's "Operating Regulations for Exploration, Development, and Production" should be included in the appendix of the statement. We suggest insertion of these regulations on page XII-1 of the draft copy.

Acting

Director



Attachment

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE

Washington, D.C. 20250

MAR 8 1974



Director, Eastern States Office
Bureau of Land Management
U.S. DEPARTMENT OF THE INTERIOR
7981 Eastern Avenue
Silver Spring, Maryland 20910

Dear Sir:

We have reviewed the Draft Environmental Impact Statement on Phosphate Leasing on the Osceola National Forest, Florida.

Our comments on this environmental impact statement are limited to general areas of concern, since the Forest Service will be working with the Bureau of Land Management in an interagency task force to prepare the final statement on this proposal. More detailed information and editorial comment will be provided when the task force meets to revise the draft.

Because they are rather lengthy, our comments are attached.

We appreciate the opportunity to review this environmental impact statement.

Sincerely,

Acting Deputy Chief,
Programs and Legislation

Enclosure

FOREST SERVICE COMMENTS

Re: DRAFT ENVIRONMENTAL IMPACT STATEMENT, PHOSPHATE LEASING
ON THE OSCEOLA NATIONAL FOREST, FLORIDA

1. DESCRIPTION OF THE ACTION UNDER CONSIDERATION

A. Action and C. History

Certain phrases on pages I-1 and I-12 imply that the existence of valuable phosphate deposits is a predetermined fact. This implication is sustained by omission of the determination of valuable deposits from the assumptions on page I-23. However, the statement on page VIII-1 "If the facts justify it, the Secretary may reach the conclusion that a valuable mineral deposit has not been shown to exist" indicates that the determination is yet to be made. The confusion as to whether this determination is a fact or an assumption should be cleared up.

D. Phosphates in the Local, Regional and National Economy: A Supply and Demand Forecast

This section needs to be clarified and expanded to fulfill the promise of its' title. The sketchy discussion of the national situation dwells on the remarkable growth of phosphate rock production but neglects domestic consumption, which has also grown of exponential rates. The national picture is consumption which has also grown of exponential rates. The national picture is difficult to assemble from the Regional data given. Figures 4 and 5 dramatically illustrate the growth in production and consumption but shed little light on the amount of reserves, or how long they will last. An analysis is needed of known reserves in Florida, the U.S., and the world to permit comparison with reserves on the Osceola. For example, it was stated at the hearings that Florida has 1.2 billion short tons of phosphate reserves; yet, no such information is given in the EIS.

Hopefully, this section could address the topic of the National Environmental Policy Act Sec. 201(3)-
"The adequacy of available natural resources (phosphates) for fulfilling human and economic requirements of the nation in the light of expected population pressures."

The conclusions on page 21 and 22 suggest that the Nation is headed on a collision course for a phosphate crisis within the next two or three decades. These conclusions may prove to be optimistic when projected demand is updated to take into account current developments in the world market. The recent price increase of Moroccan phosphate to \$42.00 per ton, as compared to \$10.00 to \$14.75 per ton for central Florida phosphate, will probably encourage increased export of Florida rock and accelerate the depletion of U.S. reserves.

Since the depletion rate of our national reserves will be strongly influenced by our exports to meet world demands it seems that any analysis of supply and demand for a Region, or the Nation, can be very misleading unless the world-wide situation is taken into account.

On the basis of information available to us, it appears that our impending national phosphate crisis is likely to coincide with a global phosphate crisis brought about by expected population pressures.

Projections by several international organizations show that the world's supply of arable land, and therefore of food, will be inadequate to support future population growth unless per-acre agricultural yields can be greatly increased. Dr. Norman Borlaug, winner of the 1970 Nobel Peace Prize, cites soil infertility as the greatest curse of the densely populated developing nations of the world and names nitrogen and phosphate as the major elements limiting crop yields.

We feel that the Environmental Impact Statement should address itself to the situations, in the not-so-distant future, when our phosphate reserves will no longer be adequate to meet domestic needs. What then? What are the opportunities for imports, from where, and at what cost? Exploration of this topic is especially appropriate in view of the prevalent rumor that the phosphate deposits of the Osceola are already, directly or indirectly, committed for export to Russia.

E-1. ASSUMPTIONS

Testimony presented by the phosphate industry at the public hearings suggests that the basic assumptions on page 1-23 be carefully reviewed for validity.

Prediction of a mining method similar to that proposed by Mr. Brooks, of Global Exploration and Development Corp., would entail a new set of assumptions. For example; more than one mining operation would be involved, one or more beneficiation plants would be located on National Forest land, additional major roads would be built to serve these plants, matrix slurry would not be transported more than 5 miles, slime ponds would not be needed, and considerably less than one third of the mined area would be left as permanent water surface. Any revision in the assumptions would, in turn, require a new look at anticipated environmental impacts.

III. ENVIRONMENTAL IMPACTS

The Statement appears unbalanced due to its preoccupation with environmental impacts on the National Forest. More emphasis needs to be given to impacts on private lands in order to present the full range of probable impacts and the full extent of the environment affected.

VI. SHORT-TERM USES VERSUS LONG-TERM PRODUCTIVITY OF THE AREA

1. LAND USES

The almost total neglect of social and economic aspects leaves a very obvious void in the analysis of this topic. We interpret the National Environmental Policy Act, 102-8, to require consideration of environmental amenities and values along with - not apart from - economic and technical considerations. CEQ Guidelines 1500.2 (b) (3) seems to echo this interpretation. Also, it follows that the public should be given some indication of the information that will be used by the Secretary of the Interior in making his determination as to the existence of valuable deposits. Therefore, it seems essential that the statement include an economic analysis, including both long-and-short term implications, of mining versus no-mining.

The analysis should consider the cost of damage to vegetation, ecosystems, improvements, and environmental amenities; the cost of planning, monitoring, and enforcement needed to achieve environmental standards; and the cost of mitigation and restoration measures needed to minimize undesirable consequences for the environment.

The geological distribution of environmental costs is clearly another important consideration. Should the inhabitants of northern Florida be subjected to the high environmental costs in order that the inhabitants of other nations can have cheaper phosphates?

Perhaps this would be the place to compare the short-term economic gains of mining, this deposit for export now - and at some later date facing the need to import expensive foreign phosphate; versus long-term benefits of holding the deposit in reserve against time of need for domestic consumption.

VIII. ALTERNATIVES TO THE PROPOSED ACTION

B-3 Leasing With Delayed Authorization To Mine:

We would like to see this alternative expanded to incorporate a requirement that applicants demonstrate ability to accomplish acceptable restoration techniques on comparable private land as a prerequisite to approval of mining plans on National Forest land.

D-5 Phosphate Recycling

This discussion should be strengthened to show comparative quantities of elemental phosphorus available in human and animal waste compared to mined phosphate. One study shows 5.3 million tons annually of elemental phosphorus in animal and human wastes compared with 6.3 million tons of elemental phosphorus in the 42 million tons of phosphate mined annually in the U.S.

D-6 Existing Slimes

The Statement should discuss mineral values in slimes removed from Government land and deposited on private lands. At some future date, these slimes will probably be valuable for their phosphate and uranium content. Will the U.S. receive a royalty for this material if ultimately recovered?

UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

State Office, P. O. Box 1208, Gainesville, FL 32602

January 25, 1974

Director, Eastern States Office
Bureau of Land Management
7981 Eastern Avenue
Silver Springs, Maryland 20910

Dear Sir:

Re: Draft Environmental Impact Statement - Phosphate Leasing on the
Osceola National Forest, Florida

Our staff has reviewed the draft environmental impact statement -
Phosphate Leasing on the Osceola National Forest that accompanied
your recent undated transmittal.

We offer the following comments for consideration:

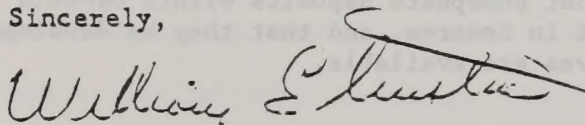
Part II, page 44, last paragraph, first sentence:
Suggest the sentence be reworded as follows: Downward percolation
is evidenced by a depression in the surface of the free water table.

This report discusses recharge through the confining beds with no
differentiation of their relative importance. This is possibly mis-
leading. Admittedly, some water passes through the "impermeable"
beds, but this water is relatively insignificant when compared to
the amount that enters the aquifer through open and sand filled
caves and sinks.

Overall the statement is excellently prepared and the wildlife
section is outstanding.

We appreciated the opportunity to comment on this statement.

Sincerely,



W. E. Austin
State Conservationist

cc: K. E. Grant
F. H. Tschirley





UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

1421 PEACHTREE ST., N. E.
ATLANTA, GEORGIA 30309

March 4, 1974

Director
Eastern States Office
Bureau of Land Management
7981 Eastern Ave.
Silver Spring, MD 20901

Dear Sir:

We have reviewed the Draft Environmental Impact Statement for phosphate leasing in Osceola National Forest in Florida and find that although it is generally well done, there are, as indicated by our attached comments, some critical issues that should be addressed. Because of the severe adverse and permanent effects of the project, we specifically believe the proposed leasing is environmentally unsatisfactory (Category E.U.). See attached category listing.

We feel that it would not be possible to safeguard the value of swamplands when alterations in the hydrologic pattern are imminent. The strip mining and the cone of depression of the piezometric surface resulting from the 20 mgd pumping could induce differing recharge mechanisms in the Floridan Aquifer, the source of water for most of north and central Florida. In view of these, and the inherent danger to the nationally valuable Suwannee River System, we feel the project should be abandoned.

It is noted that the supply and demand forecast of production and consumption of phosphate in this Statement shows that, because of the depletion, Florida's rock phosphate mines will no longer be a significant factor in the nation's supply structure after the year 2005. This coincides with the expected 30-year life of the proposed Osceola Forest mining project. Furthermore, it appears that the 120 million tons of phosphate rock under Osceola Forest represent only about 10 percent of the total Florida reserves.

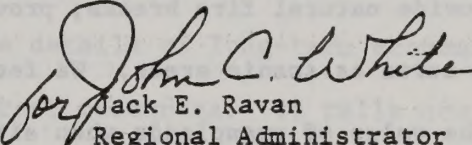
An acceptable policy in the national interest would be to establish this 120-million-ton unit as a strategic reserve in order to insure an emergency domestic supply. We strongly recommend that phosphate deposits within Osceola Forest being considered for mining be kept in reserve, and that they be developed only at such time that no other alternatives are available.

Director
Eastern States Office
Page Two

We further recommend that consideration be given to voiding existing leases with the Forest, even if it involves the purchase from, or repayment of monies to, companies holding such leases. For present requirements, it is noted that two-thirds of available phosphate in the immediate area lies under private lands outside Osceola Forest and some of these deposits are presently being developed.

Our detailed comments on the proposed project and the Statement are attached. We would appreciate receiving five copies of the Final Environmental Impact Statement when it is available. If we can be of further assistance in any way, please let us know.

Sincerely,


Jack E. Ravan
Regional Administrator

Attachments

EPA-Region IV

Comments on Draft Environmental Impact Statement for Phosphate Leasing on
Osceola National Forest, Florida

1. It is noted that 40 percent of the proposed leased area is swamplands, which have values unique unto themselves and are different from upland ecosystems. Swamps, as recognized in this Statement, serve as recharge areas for regional aquifers; provide unique habitat to fish and wildlife, including endangered species; provide natural fire breaks; provide buffering reservoirs for storm runoff; and serve as scenic areas. We feel that it would not be possible to safeguard the value of swamplands when alterations in the hydrologic patterns as described are imminent, including: miles of stream realignment, lowering of groundwater levels, diking, and direct draining of surface waters. EPA's work in the Big Cypress Swamp has shown that subtle change in the groundwater levels leads to microclimate changes in the swamp which are catastrophic in terms of reduced primary productivity and maintenance of the ecosystem.

2. The described results of land reclamation projects following active mining leaves little hope for restoration of the Forest to its present value. Many of the claims of successful restoration are represented by programs leading to the creation of golf courses, subdivisions, citrus groves, truck farms, commercial timber tracts, and impoundments. We fail to see how such land development would fit into the present concepts employed to manage Osceola National Forest. Erosion, siltation, nutrient loading, and stormwater runoff from the proposed leased areas pose a massive and incalculable threat to the

ecology of the Suwannee River system, which is being considered by the Bureau of Outdoor Recreation for Wild and Scenic River status. Deep Creek, a major tributary to the Suwannee, and located in the northwest corner of the Forest, is not only identified in this Statement as a sensitive area, but also is the site of approximately 60 to 65 percent of all mapped phosphate deposits in the Forest. Hence, and unavoidably, most of the mining activities would take place in this drainage area, thus significantly affecting the Suwannee River.

3. This Statement fails to provide details of long-term economic benefits (dollars and cents) derived from all Forest resources. It tells how much phosphate would be removed over what period of time and how many board-feet of timber would be lost; yet, no direct cost comparisons are made. We suggest that it will not be possible to decide whether a "valuable mineral deposit" (30 U.S.C. 211, Section 9, Mineral Leasing Act for Acquired Lands 30 U.S.C. 351-399) has been discovered unless comparative data are provided, showing the benefits of mining versus the costs (primary and secondary) of mining the phosphate.

4. The secondary impact of eventual conversion of up to 50,000 acres of productive forest to other uses should be discussed more thoroughly. Timber would have to be cut from other national forests to replace the lost production of Osceola. Because of the physiography of Osceola Forest, minimal sedimentation and nutrient runoff occurs when trees are normally harvested. Sedimentation and nutrient runoff may be greater in other forests where this replacement timber is cut.

5. The effluent quality of water to be discharged from the wastewater treatment system for phosphate mining and processing should be established during permit issuance proceedings pursuant to Section 402 of the Federal Water Pollution Control Act Amendments of 1972. However, State certification must first be obtained in accordance with Section 401 of the Act and application must be made 180 days prior to making a discharge. The effluent standards must at least meet those set forth in the National Pollutant Discharge Elimination System guidelines or may be more stringent, depending upon the total load of the receiving stream and its ability to maintain water quality standards. Therefore, the parameters listed in Section 1 (page 67 of the Statement) involving the substances to be discharged from the wastewater treatment system should be based on the proposed rules and regulations published in the Federal Register of December 7, 1973 (Volume 38, Number 235, Part II) entitled "Effluent Limitations, Guidelines and New Source Performance Standards", Fertilizer Industry, Leather Tanning and Finishing Industry, Sugar Processing Industry. Part 418 of this publication covers the phosphate industry, and subparts 418.12 and 418.15 cover the effluent limitations.

6. The interrelationships and cumulative impacts of this proposed action and other related present or future mining on Federal lands are not adequately discussed. For example, no consideration is given to the potential environmental effects of shifting phosphate mining from Osceola Forest to the western Permian phosphate beds on Federal lands.

7. According to this Statement, the siltation rate for the Forest's undisturbed flatwoods areas is 0.01 tons per acre per year. But the overburden exposed through mining would be subject to sheet erosion at 111 tons per acre per year, an 11,000 percent increase in rate. The Statement goes on to say that the three miles of dikes constructed yearly in the mined area would expose 30 acres of overburden on their outer slopes, with an estimated 55 tons per acre, or 1,650 tons of sediment, could enter streams in the area from each unvegetated 30-acre exposure. If only a small fraction of this siltation occurs, the makeup of local stream life would be expected to be radically altered.

8. The proposed mining regime in Osceola Forest would reduce the area available for many types of recreational visits from nearby population centers.

9. According to this Statement, only phosphate mining will take place within the actual confines of Osceola National Forest. Chemical fertilizer processing, "slime pond" locations, gypsum disposal, and sulphuric acid manufacture will take place on private holdings juxtaposed to the Forest lands. Consequently, the only expected air pollution effects directly generated within the Forest confines will be the fugitive dust problem from the mined area itself, and from dirt roads, plus the automotive and other internal combustion engine emissions associated with the development of the mining industry.

It must be pointed out that emissions from the industrial plants would have an effect on the ambient air over the Forest. The sulphuric acid production unit would have to meet the Standards of Performance for New Stationary Sources as outlined in Subpart H of the Federal Register of December 23, 1971 (Volume 36, Number 247). These standards restrict the quantities of sulphur dioxide and acid mist that may be emitted by the plant. However, to the extent that the

emission plumes penetrate the Osceola Forest airspace, the ambient air quality therein would be degraded as to sulphur dioxide and acid mist content. If fossil fuel is used to supply the heat in the rock dryer (the Statement is silent on the heat source) its emissions, although controlled by these standards required by the Florida Process Weight Table, would add to the burden of potential air pollutants in the Forest. This potential impact should be defined.

At the time these comments were prepared, EPA had not promulgated new Source Performance Standards for phosphate fertilizer chemical processing plants. A recognized hazard and one that will be addressed in the standards when promulgated, are flouride emissions. A limitation of the number of pounds, or fraction thereof, of flourides which may be emitted per ton of phosphorus pentoxide processed, is being considered on wet processing, granular triple superphosphate, run of pile triple superphosphate manufacture and storage, and superphosphation. Flourine and its compounds introduced into the Forest through the air would have an effect as noted in the foregoing comments applying to sulphur dioxide and acid mist emissions.

10. A more thorough examination needs to be made of the effect of flourides which would be deposited within the Forest from the mining and processing operations. Flouride effects on food chain and nutrient recycling in the Forest ecosystem should also be investigated. Some form of control on the volatile flourides which vaporize from the various types of active and abandoned storage ponds formed through the phosphate mining process may be necessary to prevent concentration of flouride in leaf tissues of forest plants.

11. This Statement does not address the question of how much of the 20 mgd makeup water will run off from the mining area. Any significant runoff would provide ready transport for waterborne pollutants to the Suwannee River. It should be noted that normal streamflow in the area is extremely variable. Hurricanes and prolonged droughts cause local streams to flood periodically or wane. Therefore, maintenance of a normal flow regime would be important to the biota which naturally are adapted to presently existing conditions. These conditions must be considered when planning activities which would alter the landscape and change runoff distribution. A direct effect of the mining would be the alteration of the vadose water quality and quantity. The strip mining, plus the cone of depression resultant from the 20 mgd pumping, could induce differing recharge mechanisms in the Floridan Aquifer, the source of water for most of north and central Florida. (Nearby, a municipality, Lake City, a town of 16,000, uses less than one-tenth this quantity of water and has had to drill five wells in order to insure its supply.)

12. During the 30-year active mining period, tropical storms accompanied by intense rainfall could be expected to pass over the Forest. All retention ponds, dikes, ditches, berms, and dams would have to be constructed in such manner as to survive severe weather conditions, especially hurricanes. After the 30-year active mining period expires, all retention facilities would have to be permanently stabilized and regularly inspected in perpetuity to avoid future spills.

13. According to this Statement, about 400,000,000 kilowatt hours per year of electricity would be needed for proposed mining activities. The generation of this annual quantity of electricity could require about 80,000 metric tons of coal or 300,000 barrels of oil. The consumption of these

non-renewable resources would produce solid and gaseous products in the following approximate minimum amounts:

<u>Substance</u>	<u>Metric Tons Per Year</u>	
	<u>Coal Fired Plant</u>	<u>Oil Fired Plant</u>
SO ₂	1,478	987
NO _x	850	375
Particulates	125	125
Ash	9,375	987

Control, treatment, ultimate disposal, and environmental effects of the foregoing products are significant secondary effects of the proposed mining and should be addressed.

14. The Section "After Mining" (page III-9) should be discussed more fully. For example, in paragraph 3, it is stated that "infiltration of rainwater would be slow because the surface of the reclaimed material would consist of a mass of structureless material high in clay content." However, if the overburden is removed in two stages, which could be easily done, and the organic and sandy soils replaced on the land surface, the after mining soil conditions would be more similar to the original conditions without the decrease in the percolation rate described.

15. We feel the description of the environmental effects of the exploration phase of the operation is incomplete and inadequate. Roads will need to be built, drill sites cleared, and, in swampy areas, drill work pads would be built with fill material. These factors should be addressed.

16. More modern practices and approaches have been developed for reclaiming strip mined areas than those described in the Section, "Mining."

We recommend more research and rewriting of this Section. (See EPA's Publication 430/9-73-011 "Process, Procedures, and Methods to Control Pollution From Mining Activities" and its list of 125 references.)

17. Sufficient data should be available on increases in the nitrogen and phosphate content in ponds on strip mined property in Florida to predict the levels that could be expected at the proposed site. Therefore, we suggest avoidance of such statements as on page III-4: "Static or ponded water areas would increase slightly in total phosphate . . .". Phrases such as "increase slightly" should be replaced with facts and figures, attainable from the Florida Department of Pollution Control files on the subject.

18. On page III-21 (paragraph 2), explanation should be given as to whether the effects of created lakes are expected to be adverse or beneficial to the Floridan Aquifer. Water quality data for each aquifer and for the phosphate ponds are available from the U.S. Geological Survey and other Department of the Interior files in Florida. We recommend use of these data to predict water quality changes.

19. Figure 24 does not show the aquifer recharge status of Osceola Forest. Data in this Statement suggest that because of the relationship between the land elevation and piezometric surface existing in the proposed mining area, significant aquifer recharge occurs there. Flow lines would aid in the interpretation of this figure.

20. On page IV-7, we suggest that the approach on development and utilization of the water resources for artificial recharge be expanded.

21. In Section VII-B, we suggest the listing of canals, since they constitute major land form changes.

22. This Statement comments that if phosphate mining is curtailed, exports will be limited, consequently adversely affecting our balance of trade. We suggest that the availability of other sites where phosphate mining could take place without significant environmental damage should be examined. Utilization of these areas could well make up for limitation on mining in Osceola Forest.

23. This Statement should address the potential problem of increases in the ambient radiation level produced by mining phosphate rock in terms of environmental impact and population exposure. Phosphate rock contains uranium in equilibrium, but once this equilibrium is disturbed by mining, radium and radon are released and may increase the environmental radiation level significantly. In other locations in Florida where similar operations have occurred, radiation dose rates have escalated from 2 microroentgens/hour prior to rock removals to as much as 100 microroentgens/hour as mining progresses. Specific comments in this area of concern are as follows:

a. Page I-23. The mining of 4 million tons/year (120 million tons total) would expose 217 tons of natural uranium and 3.6 curies of radium to the environment each year, or a total of 6,500 tons (page VII-1) of uranium and 108 curies of radium. Under present technology, virtually all the uranium would be carried with the fertilizer and be spread on the nation's fields, while the radium would be in the liquid and solid wastes from the acidulation step. Technology exists for recovery of uranium from the fertilizer, but not the radium.

b. Page I-45. The problem with mixing slimes with sand tailings for reclamation is that the slimes contain virtually the same radium concentration (50 pci/g) as the matrix. When this material is spread on the land surface, above the water table, the result is increased radon decay product concentration at the surface, increasing the hazard for use of the land for housing.

c. Page I-48. Calcining of phosphate rock liberates the radon decay products contained in the rock. A study is now under way by EPA (NERC, Las Vegas) as to the hazard. In one case, background polonium-210 concentrations in the air were increased 15 times as a result of a small calcining operation. This is counter to FRC (Federal Radiation Council) policy.

d. Page I-52. The acidulation step is the site of a major partitioning: virtually all the uranium is carried with the fertilizer, while the radium precipitates with the by-product gypsum. Two plants are now building uranium-recovery circuits to capture this increasingly scarce commodity. Gypsum is too high in Ra-226 for any use and must be stabilized to prevent erosion or leachir

e. Page I-85. Triple superphosphate does not involve gypsum removal; hence, the TSP has all the incoming Ra-226.

f. Page I-59. In regard to slimes, see comment b. Failure of slime ponds (a major occurrence) results in a massive release of leachable Ra-226 to the surface water.

g. Page I-64. The "contaminated water" is high in Ra-226 (100 pci/l or 30 times the maximum permissible concentration). The proposed "best practical control technology currently available" is "double-liming" which does remove Ra-226. Major problems exist where the highly-acid "contaminated water" seeps

into the underlying limestone, resulting in groundwater contamination.

h. Page I-78-79. The double-liming precipitates Ra-226, resulting in a radioactive solid waste.

i. Page I-80. The only way the "seepage ditches" can be effective is to maintain a groundwater cone; otherwise, contamination of groundwater with Ra-226 occurs.

j. In Figure 13, the Hawthorn Formation is shown to include the top of the Floridan Aquifer, which highlights the danger of seepage from "contaminated water" ponds.

k. Page II-13d. The presence of uranium (but not radium) is noted, but nothing is said about potential recovery.

l. Page II-35. Discussion of Swift Creek illustrates water quality problems from a fertilizer plant. Radium is also almost certainly too high.

m. Page III-4. The by-product gypsum also is radioactive and must be stabilized.

n. Page III-23. Table should include Rn-222.

o. Ditches around a pool are not sufficient to preclude groundwater contamination. The gypsum pile will continue to serve as a source of Ra-226 unless graded or sealed to prevent infiltration.

p. Page V-2. The uranium resource need not be lost, as it can be recovered from the phosphate acid.

q. Page V-4. Another air pollution problem would result from the radon daughter emissions.



STATE OF FLORIDA

Department of Administration

Office of The Secretary

THE CAPITOL

TALLAHASSEE

L. K. Ireland, Jr.
SECRETARY OF ADMINISTRATION

Reubin O'D. Askew
GOVERNOR

32304

January 18, 1974

Director, Eastern States Office
Bureau of Land Management
7981 Eastern Avenue
Silver Springs, Maryland 20910

Dear Sir:

Functioning as the state planning and development clearinghouse contemplated in U. S. Office of Management and Budget Circular A-95, we have reviewed the following draft environmental impact statement prepared by the U. S. Department of Interior, Bureau of Land Management:

Phosphate Leasing on the Osceola National Forest, Florida.
SAI Number 74-0515-E.

During our review we referred the environmental impact statement to the following agencies, which we identified as interested: Department of Agriculture and Consumer Services; Board of Trustees of the Internal Improvement Trust Fund; Department of Community Affairs; Department of Commerce; Game and Fresh Water Fish Commission; Department of Health and Rehabilitative Services; Department of Legal Affairs; Department of Natural Resources; Department of Pollution Control; Department of State - Division of Archives, History and Records Management; Department of Transportation; Florida Audubon Society; and the Environmental Information Center through which comments by the Florida Defenders of the Environment were received. Agencies were requested to review the statement and comment on possible effects that actions contemplated could have on matters of their concern. Letters of comment on the statement are enclosed from the Department of Agriculture and Consumer Services; Board of Trustees of the Internal Improvement Trust Fund; Department of Community Affairs; Game and Fresh Water Fish Commission; Department of Natural Resources; Department of State - Division of Archives, History and Records Management; Department of Pollution Control; Department of Transportation; and Florida Defenders of the Environment. No further responses have been received at this time. Any further letters of response will be forwarded when received.

We have reviewed this statement and the review comments thereon. The environmental impact statement is a well prepared and comprehensive document which appears to be an earnest attempt to identify and fully

disclose the potential environmental impacts of the proposal. It is our opinion that the statement satisfies both the letter and the spirit of Section 102 (c) of the National Environmental Policy Act. This is commendable.

The leasing of lands in the Osceola National Forest as proposed in this statement would result in numerous adverse environmental effects which could not be avoided and irretrievable losses of a vast amount of natural resources. Considering the relatively small amount of phosphate located in the Forest as compared to that on adjacent privately owned lands and in other parts of the state and country, and that there appears to be sufficient amounts of phosphate in areas other than national forests to meet present and future demands, we hold that this proposal, if approved, would conflict with not only the Purpose of the National Environmental Policy Act, but also specifically Section 101 (a) (3, 4, 5, and 6) of the Act.

As evidenced in the enclosed letters of comment, subjection of a national forest to the destruction which would accompany phosphate mining is environmentally unacceptable and is in stark conflict with State policy, plans, goals, and objectives. It is the policy of the State, as set forth in the State Constitution, to protect and conserve the natural resources and scenic beauty of the State. Therefore, it is the strong position of this State that any and all applications to lease land in the Osceola National Forest for phosphate mining should be rejected.

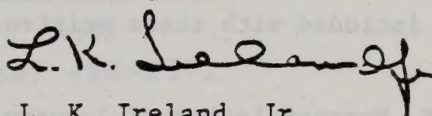
Further, we believe that phosphate mining is an illegitimate use of national forest land, would be contrary to the best public interest, and that a decision to mine in the Osceola National Forest would be a severe breach of the public trust vested in its government. Should the ultimate decision maker, after having read this environmental impact statement, the review comments thereon, and the minutes of the public hearings on this proposal, decide to issue these leases, then we submit that: (1) some of our more basic democratic principles of government will have been violated; and (2) the effectiveness of the National Environmental Policy Act may be sufficiently reduced to justify its re-examination with a view towards either strengthening or rescinding it in order that the tremendous amounts of human and monetary resources expended in reviewing and evaluating such proposals as this one, subsequently become meaningful or reallocated to some more useful purpose.

In accordance with the Council on Environmental Quality Guidelines concerning statements on proposed federal actions affecting the environment, as required by the National Environmental Policy Act, and U. S. Office of Management and Budget Circular A-95, this letter, with attachments, should be appended to the final environmental impact statement on the project. Comments regarding this statement and project contained herein or attached hereto should be addressed in the statement.

Page Three
January 18, 1974

We request you forward us copies of the final environmental impact statement prepared on this project.

Sincerely,



L. K. Ireland, Jr.

LKIjr/Swp

Enclosures

cc: Mr. John Bethea
Mr. Charles Blair
Mrs. Marjorie Carr
Mr. Randolph Hodges
Mr. O. J. Keller
Mr. Joel Kuperberg
Mr. Ray L'Amoreaux
Mr. John Lisle
Mr. William Partington
Mr. Hal Scott
Mr. R. Charles Shepherd
Mr. Robert L. Shevin
Mr. Don Spicer
Mr. H. E. Wallace
Mr. Robert Williams
Mr. Ken Woodburn

Reference: L. K. Ireland letter of January 18, 1974

Response of Florida Defenders of the Environment enclosed with reference letter was also presented as oral testimony at Lake City, Florida hearings on January 17, 1974 and is not included with these written comments.

Reference: E. E. Maroney letter of January 29, 1974

Comments submitted with this letter are duplicated of oral testimony or previously received written comments and are therefore not attached.

Enclosures were:

Charles Lee - Testimony presented at Tallahassee hearings, January 21, 1974

Edna Loehman - See written comments.
Florida Defenders of the Environment, January 25, 1974

Paula Christy Smith - Testimony presented at Lake City hearings, January 17, 1974

Ronald E. Loehman - Testimony presented at Lake City hearings, January 17, 1974

Reference: Earl M. Starnes letter of January 22, 1974

Enclosure entitled Draft Operating Manual For Developments of Regional Impact is not included in Appendix 19. This document is on file and available for public inspection at:

Eastern States Office
Bureau of Land Management
7981 Eastern Avenue
Silver Spring, Maryland 20910



STATE OF FLORIDA

Department of Administration

Division of State Planning

660 Apalachee Parkway IBM Building

TALLAHASSEE

32304

(904) 488-2371



Reubin O'D. Askew
GOVERNOR

Earl M. Starnes
STATE PLANNING DIRECTOR

L. K. Ireland, Jr.
SECRETARY OF ADMINISTRATION

January 29, 1974

Director, Eastern States Office
Bureau of Land Management
7981 Eastern Avenue
Silver Springs, Maryland 20910

RE: Phosphate Leasing on the Osceola National Forest, Florida.
SAI Number 74-0515-E.

Dear Sir:

Enclosed are additional comments on the above environmental impact statement. Please append these letters to Mr. L. K. Ireland's letter of January 18, 1974.

Sincerely,

E. E. Maroney, Chief
Bureau of Intergovernmental Relations

EEM/wdp

Enclosures



STATE OF FLORIDA

Department of Administration

Division of State Planning

660 Apalachee Parkway - IBM Building

TALLAHASSEE

32304

(904) 488-2401

Reubin O'D. Askew
GOVERNOR

L. K. Ireland, Jr.
SECRETARY OF ADMINISTRATION

Earl M. Starnes
STATE PLANNING DIRECTOR

January 22, 1974

Mr. Lowell J. Udy, Director
U. S. Department of the Interior
Bureau of Land Management
Eastern States Office
7981 Eastern Avenue
Silver Springs, Maryland 20910

Dear Mr. Udy:

My statement at the public hearing on the Bureau of Land Management proposal to lease lands on the Osceola National Forest for phosphate mining held in Tallahassee on January 21 referred to the relationship of mining to the Florida Land and Water Management Act of 1972, particularly that portion of the law dealing with developments of regional impact. Enclosed please find a copy of the Draft Operating Manual for Developments of Regional Impact, and pertinent excerpts from our Report and Recommendation on Developments of Regional Impact Guidelines and Standards.

We hope this information will be useful.

Sincerely,

Earl M. Starnes
Director, Division of State Planning

EMS/Wdp

Enclosures

Development of Regional Impact

GUIDELINES AND STANDARDS

Report and Recommendations

to the

Administration Commission

By the

Department of Administration
Division of State Planning

January 31, 1973

(Revised March 7, 1973)

TABLE III

FLORIDA INDUSTRIAL PARKS HAVING A SITE SIZE
GREATER THAN ONE SQUARE MILE

Industrial Park	Site Size
Apalachicola Air Base Park	1,400 Acres
Bartow Airport Industrial Center	1,600 Acres
DeLand Municipal Airport Industrial Park	1,200 Acres
Fernandina Beach Port Authority Site	1,200 Acres
Fort Lauderdale Executive Airport & Industrial Airpark	1,100 Acres
Blount Island Industrial Port	1,500 Acres
Imeson International Industrial Park	1,400 Acres
Keystone Air Park	1,000 Acres
Marianna Municipal Airport and Industrial Park	1,600 Acres
Industrial Air Center - Cape Kennedy Regional Airport	1,200 Acres
Greater Miami Industrial Park, Inc.	836 Acres
Seaboard Industrial Park	800 Acres
City of Naples Airport	659 Acres
Central Florida Industrial Park, Inc.	1,160 Acres
Orlando Central Park (Privately owned by Martin Marietta Corp. & Brooks, Harvey & Co.)	2,000 Acres
Poinciana Park	5,000 Acres
Ormond Beach (Tomoka) Airport	1,100 Acres
Tanner Industrial Area	1,200 Acres

Source: Handbook on Florida Industries for 1971-72

Mining Operations

Guideline.--Any proposed solid mineral mining operation which annually requires the removal or disturbance of solid minerals or overburden over an area, whether or not contiguous, greater than one hundred (100) acres or whose proposed consumption of water would exceed three million (3,000,000) gallons per day. In computing the acreage for this purpose, a removal or disturbance of solid minerals or overburden shall be considered part of the same operation if it is all located within a circle, the radius of which is one mile and the center of which is located in an area of removal or disturbed solid minerals or overburden.

As used in this subsection, the term "overburden" means the natural covering of any solid mineral sought to be mined, including, but not limited to soils, sands, rocks, gravel, limestone, water or peat.

As used in this subsection, the term "solid mineral" includes, but is not limited to, clay, sand, gravel, phosphate rock, lime, shells (excluding live shellfish), stone and any rare earths contained in the soils or waters of this state, which have heretofore been discovered or may be hereafter discovered.

The standards employed in this proposed guideline recognize the regional effects that mining operations of a certain scale can have on disrupting extensive areas of topsoil or consuming large quantities of water. Since it is one of Florida's most precious natural resources, mining operations which consume large quantities of water should be carefully studied and regulated to insure the least possible loss of water and damage to underground water systems. For example, there is presently a "cone of depression", a lowering of the water table, centering on the phosphate mining areas around Bartow, Florida, and extending over several counties.⁵

The possibilities of reclamation in mined areas need to be carefully evaluated as well. It is uncertain how successful present day reclamation procedures in the phosphate industry have been and whether mined over land and land used for "tailings" still has productive uses. These factors need to be carefully weighed when deciding what impact a given mining operation will have on a region.

Mining and phosphate mining in particular can also create a significant economic impact on a region. According to the U.S. Bureau of Mines Florida produces more phosphate than all the other states combined -- approximately 77 percent of the nation's supply and 30 percent of the world's supply.⁶ Phosphate is Florida's most valuable mineral resource and its future development and exploitation will profoundly affect the state's economy. Careful assessment of a proposed mining operation is a necessity if the state is to achieve the maximum economic development consistent with protection of its land and water resources.

Office Parks

Guideline.--Any proposed office park operated under one common property ownership or management, that:

- a) occupies more than thirty (30) acres of land; or
- b) encompasses more than three hundred thousand (300,000) square feet of gross floor area.

Office parks of the magnitude described in this guideline frequently attract large numbers of employees, clients and visitors which require highly interrelated support facilities



January 8, 1974

Mr. Ed Maroney, Chief
Bureau of Intergovernmental Relations
Division of State Planning
Department of Administration
IBM Building
Tallahassee, Florida 32304

Reference: SAI 74-0515E

Dear Mr. Maroney:

Our Division of Forestry reviewed the Draft Environmental Impact Statement on Phosphate Leasing on the Osceola National Forest drawn up by the U.S. Department of the Interior and I am forwarding their comments on to you.

In reviewing the proposal, the Division of Forestry feels the proposed action would permanently destroy or substantially reduce the productivity of a significant area of forest land currently dedicated to the continuous production of timber, range, wildlife, recreation, and water values.

The proposed production of 120 million tons of phosphate rock over a period of 30 years from preference right leases of 52,000 acres on the Osceola National Forest must be weighed against the permanent loss of a renewable productive forest resource. The two operations obviously are not compatible, nor does there seem to be any viable alternatives that we can determine that would permit compatible management of the two operations.

It should be pointed out that the current Draft Environmental Impact Statement points out the supply and demand picture for phosphates for the next 28 years, but it does not make similar comparisons of supply and demand of the timber resource that will be destroyed. This is a glaring omission, because, in fact, the nationwide demand for forest products is expected to almost double; increasing from 12.7 billion cubic feet in

1970 to 20.7 billion cubic feet in the year 2000. (Page 207, table 150, "The Outlook for Timber in the United States", FRR20, FS, USDA, October 1973).

Furthermore, Southeast Georgia and Northeast Florida is probably the most highly competitive area for forest product drain in the United States. Historically, the National Forests have been held as national timber reserves for the purpose of supplying future forest products and services in the face of ever diminishing areas of private forest land in this country. Florida particularly is vulnerable because of its rapid growth and consequent conversion of privately owned forest to other uses. It is therefore essential that all national forests be held intact for their designated purpose.

The case has not been similarly made for phosphate production. Figure 4, Page I-16 of the Draft Environmental Impact Statement shows production of phosphate outstripping domestic consumption to ever widening degree in future years. Production from this area is not actually needed. Furthermore, alternative areas of supply are available in the inland plateau area of the west. Production of phosphates in the west would have far less environmental impact and resource impact because of sparsity of population and significantly less biological potential. Far more future timber supplies can be produced in the southeast than can be produced in the western plateau areas. The area of phosphate deposits in the west appear to be 12 to 15 times the area of deposits in Florida and North Carolina.

No real comprehensive analysis has been made of the unavoidable losses that accrue as a result of the proposal and one should be made.

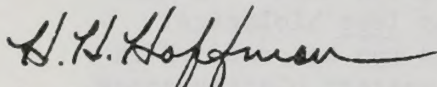
Under Timber, (Section V, Adverse Effects That Cannot Be Avoided, Page V-7) annual growth losses are estimated at 200,000 board feet per year on each thousand acre mined plus the conversion of 9,000 acres to lakes. If one takes only an eyeball estimate at this impact it runs something like this. There are six million board feet of permanent growth loss annually on the 30,000 acres of mined area. There are 2.5 million board feet of production loss annually on the 9,000 acres of land that will be permanently removed from timber production and converted to lakes. This total loss of $8\frac{1}{2}$ million board feet when valued at a conservative stumpage rate prevailing in the area of \$100 per thousand board feet, amounts to an annual stumpage loss of \$850,000. It is pretty well documented in the forest economic literature that \$1.00 of stumpage

Mr. Ed. Maroney
January 8, 1974
Page Three

ultimately produces \$25 in gross national product. This annual loss of production therefore would amount to some \$21,000,000 loss of gross national product. On rather flimsy evidence the Draft Environmental Impact Statement estimates that timber productivity can be restored in several hundred years (Pages VII 3 and 4). Although the statement also admits that hardwood areas will probably be permanently destroyed, "no one really knows at this point whether productivity can ever be recovered or restored. But even if this is so, an annual loss in gross national product from timber of \$21,000,000 over, say 300 years, certainly outweighs the 30 year benefit from mining 120 million tons of phosphate over the next 30 years. This does not include the large, but unquantified values accruing in the form of fish and wildlife habitat, recreation, and range.

For the foregoing reasons we recommend denial of the lease and introduction of legislation to provide compensation for the applicants and the support of Appendix 18 - A Proposed Bill To Reform Mineral Leasing Laws in the United States.

Sincerely,



H. H. Hoffman
Assistant Commissioner

HH/rc

cc: Mr. John M. Bethea, Director, Division of Forestry



STATE OF FLORIDA

BOARD OF TRUSTEES OF THE INTERNAL IMPROVEMENT TRUST FUND

ELLIOT BUILDING — TALLAHASSEE, FLORIDA 32304

Joel Kuperberg
Executive Director

TELEPHONE 488-8123

JANUARY 18, 1974

Mr. E. E. Maroney, Chief
Bureau of Intergovernmental Relations
Department of Administration
725 South Bronough
Tallahassee, Florida 32304

Dear Mr. Maroney:

United States Department of Interior, Draft
Environmental Impact Statement on Phosphate
Mining Leases in the Osceola National Forest,
Columbia and Baker Counties. SAI Project
Number 74-0515E.

The Trustees staff has reviewed the draft environmental impact statement on the proposed phosphate mining leases within the Osceola National Forest. The following comments are submitted:

1. This agency is concerned about the possible degradation of Florida's streams and rivers as a direct result of the proposed phosphate mining operations in the Osceola National Forest. Alteration of existing topography, siltation and pollution, and reduction of water resources would be realized within a very short period of time, and would remain as a permanent scar. As custodian of the state lands nearby, this agency foresees significant damage to natural drainage and water quality as a result of the removal of the vegetative filter of the region. We feel that severe damages to the historic Suwannee River could be anticipated. The Suwannee is one of the most beautiful rivers in the Southeastern United States. Damages to a riverine system of this magnitude could endanger shellfish nursery grounds as far as the Gulf of Mexico as well as the river biome.

2. The lands beneath Ocean Pond are also sovereign lands of Florida. These lands and their products would be threatened by degradation, from direct discharges of pollutants and from contamination of the air. Concentrations of sulfuric

Mr. E. E. Maroney
Page 2

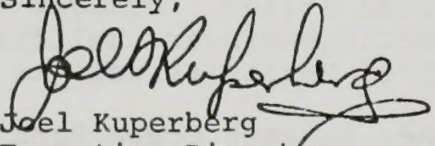
compounds described in the statement could lead to significant reduction of water quality from airborne pollutants and dust. This agency is charged to police, protect and prevent depredation on and to the sovereign lands of the state and the products thereof; pollutants of the nature described in the statement have no place in Florida's valuable aquatic systems.

3. The depletion of ground water supplies in North Florida as a result of dewatering, and high pressure washing and processing as expressed in the statement would be a massive problem. As urban growth in the eastern portion of the state expands westward, away from the coastal area, water supply will be a primary determining factor in the feasibility of the area to maintain population growth. This agency feels that long term use to Man and therefore, economic value of lands may be seriously affected by this depletion of ground water resources.

4. Another related problem to that described above is the need for maintaining reservoir areas, such as Ocean Pond, for purposes of public water supply for the growing urban population of the consolidated City-County of Jacksonville. This site is within 70 miles of the City of Jacksonville and would be one of the major sources for water storage in the event ground water resources became insufficient. The possible contamination of this resource storage area as a result of sulfuric processing in the immediate area needs to be considered.

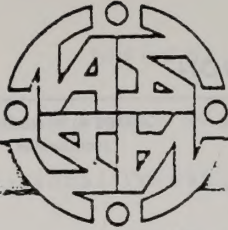
The excellent draft environmental impact statement for this proposed lease properly assesses many of the factors of concern to this agency. As a reference, this document will be valuable in the future review of projects of this nature. We appreciate the opportunity to comment on this draft statement and recommend the no project alternative for phosphate mining in the Osceola National Forest, and support revision of the mining laws to protect such areas.

Sincerely,



Joel Kuperberg
Executive Director

JK/wsm



State of Florida
Department of Community Affairs
DIVISION OF TECHNICAL ASSISTANCE

Reubin O'D. Askew, Governor
Edward J. Trombetta, Secretary
R. Charles Shepherd, Director

January 14, 1974

Mr. Ed Maroney, Chief
Bureau of Intergovernmental
Relations
Division of State Planning
725 South Bronough
Tallahassee, Florida

RE: EIS on Phosphate Mining in the Osceola National
Forest, Florida (SAI:74-0515)

Dear Mr. Maroney:

Staff of the Division of Technical Assistance has reviewed the draft Environmental Impact Statement. We feel that the proposed phosphate mining would conflict with our goals and objectives.

We feel that with the emergence of the shorter work week, population growth, and a new emphasis on outdoor leisure activities, the destruction of the forest and its recreation resources would be disastrous. The projected population growth of the Eastern states demands the preservation of existing recreation resources.

The mining on the adjacent private lands will, undoubtedly, have some adverse effect on the forest and resources. Hopefully, thorough supervision of the mining on the private lands can be made to protect the forest.

Sincerely,

R. Charles Shepherd
Director

RCS/mu

DIVISION OF STATE PLANNING, Bureau of Intergovernmental Relations
JAN 17 1974
RECEIVED
SAI NO. _____

FLORIDA GAME AND FRESH WATER FISH COMMISSION

HOWARD ODOM, Chairman
Marianna

OGDEN M. PHIPPS, Vice Chairman
Miami

E. P. "Sonny" BURNETT
Tampa

O. L. PEACOCK, JR.
Ft. Pierce

JAMES B. WINDHAM
Jacksonville

DR. O. E. FRYE, JR., Director
H. E. WALLACE, Assistant Director



FARRIS BRYANT BUILDING
620 South Meridian Street
Tallahassee, Florida 32304

January 17, 1974

Mr. E. E. Maroney, Chief
Bureau of Intergovernmental Relations
Department of Administration
660 Apalachee Parkway
Tallahassee, Florida 32301

Re: SAI #74-0515E, Osceola National
Forest, Phosphate Mining

Dear Mr. Maroney:

The Environmental Protection Section of the Florida Game and Fresh Water Fish Commission has reviewed the above referenced environmental impact statement and concurs with the assessment and evaluation of the potential impacts resulting from the proposed phosphate mining.

Enclosed is a copy of a resolution which was unanimously passed by the Commission during an official meeting held on Friday, January 11, 1974. This resolution will be presented at the public hearing to be held in Tallahassee January 21, 1974, and is self-explanatory regarding this agency's objections to the prospect of phosphate mining in the Osceola National Forest.

Please feel free to contact me if further comments are desired.

Sincerely,

A handwritten signature in dark ink, appearing to read "H. E. Wallace", with a long, sweeping horizontal line extending to the right.

H. E. Wallace
Assistant Director

HEW/RDD/ra
Enc.

R E S O L U T I O N

WHEREAS, holders of Phosphate Prospecting Permits have applied for the issuance of phosphate right leases on 52,000 acres or one-third of the Osceola National Forest, and

WHEREAS, the extraction of phosphate from the Osceola National Forest would severely impact the natural habitat of at least 11 threatened species (American alligator, Florida panther, red cockaded woodpecker, Florida sandhill crane, southern bald eagle, Arctic peregrine falcon, Florida manatee, Suwannee bass, indigo snake, Florida weasel, wood ibis) and many other species of wildlife, and

WHEREAS, the Osceola National Forest contains approximately 20% of the State of Florida's scarce black bear habitat and 60% of the forest's optimum bear habitat is within the proposed lease area and will be eliminated, and

WHEREAS, the carrying capacity of the Osceola Forest's deer herd will be significantly reduced, and

WHEREAS, habitat that supports a viable wild turkey population would be eliminated from the western portions of the National Forest, and

WHEREAS, estimations indicate the destruction of natural wildlife habitat would reduce by approximately one-third the hunting recreation days on the forest, and

WHEREAS, present predictions indicate that hunting visitor day use in 1990 will exceed the present carrying capacity of the National Forest, and

WHEREAS, the mining operation will destroy the natural aquatic ecosystem in the western portion of the Osceola Forest, and

WHEREAS, the value of the Suwannee River as a fishery resource would be seriously affected by increased runoff, siltation, turbidity and chemical spills resulting from mining operations in the tributaries and floodplains of the river, and

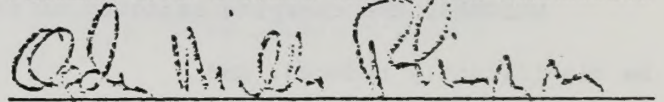
WHEREAS, visitation to the Osceola National Forest totaled over 161,500 visitor days during calendar year 1972, and

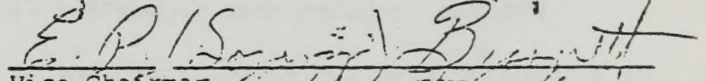
WHEREAS, the Forest serves the recreational needs of out-of-state visitors and of residents of metropolitan Jacksonville, Florida's second-most populous city, and

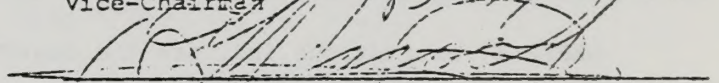
WHEREAS, the aesthetic value of the western one-third of the Forest will be seriously degraded to the detriment of campers, hikers, fishermen, hunters and other outdoor recreationists.

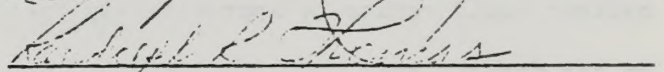
NOW, THEREFORE, BE IT RESOLVED, that the Florida Game and Fresh Water Fish Commission hereby opposes any and all phosphate mining or extraction from within the confines of the Osceola National Forest.

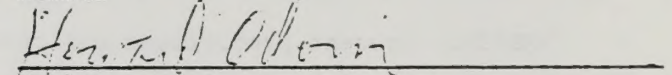
FLORIDA GAME & FRESH WATER FISH COMMISSION


Chairman

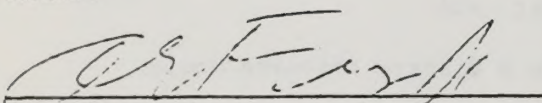

Vice-Chairman


Member


Member


Member

ATTEST

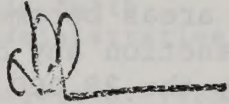

Director



State of Florida
DEPARTMENT OF NATURAL RESOURCES

INTEROFFICE MEMORANDUM

January 14, 1974

To: Jim Smith
From: Ney Landrum 
Subject: SAI No. 74-0515-E Phosphate leasing on the Osceola
National Forest

The Division of Recreation and Parks recommends that the permittees of leases to mine phosphate on the Osceola National Forest be strongly urged to relinquish their options to the Secretary of the Interior by a mutually satisfactory arrangement.

It is totally inconceivable to the Division of Recreation and Parks that the virtual destruction of 28,000 acres of public land in Florida can even be contemplated at a time when the State of Florida is spending \$240 million to acquire similar environmentally endangered lands within the state. Such action is contradictory, and devoid of the fundamental concepts of good long-range planning.

Phosphate mining completely destroys most of the components necessary for recreational lands: aesthetic quality, soil, relief, water, vegetation and wildlife. It should be assumed that even after an extensive reclamation program the land would be permanently changed and the opportunity for recreational use would be greatly reduced.

We find it ironic that the Florida Department of Transportation in observance of Section 4(f) of the Federal Highway Code must expend great amounts of energy in the avoidance of recreation area/highway conflicts (even though they seldom contemplate needing more than a few acres), while this contemplated destruction of 28,000 acres of much-needed open space and recreation land would appear to be just short of a foregone conclusion. As does the Department of Transportation, the U. S. Department of the Interior should seek alternatives that do not destroy that which we are at this very moment trying to protect - our open spaces and environmentally endangered lands.

Memorandum to Jim Smith
Page two
January 14, 1974

As the second fastest growing state in the nation and a leading tourist destination, Florida is currently experiencing growing pains; and while less acute in north Florida, this will not be the case much longer. State planners have already predicted that the area around the Osceola National Forest will soon be caught up in the prevailing growth pattern further to the south, as life in the burgeoning metropolitan areas becomes less attractive. It is unreasonable, therefore, to sanction any decrease in public recreational resources, let alone by the 28,000 acres contemplated in the Environmental Impact Statement.

NCL/pmm



State of Florida
DEPARTMENT OF NATURAL RESOURCES

INTEROFFICE MEMORANDUM

January 10, 1974

TO: Jim Smith
Administrative Assistant

FROM: Robert O. Vernon, Director
Division of Interior Resources

SUBJECT: SAI No. 74-0515 E Being Environmental Impact
Study Covering Phosphate Mining in the
Osceola National Forest.

The environmental impact statement is complete and covers the problem and advantages of the proposed mining and the geology and hydrology of the area in question. It fails to outline in detail what reclamation procedures or requirements will be adopted as a part of the lease arrangement by the Federal Government. It does, however, acknowledge problems to be anticipated in the placement and recovery of spoil, soils, lakes, and slime retention areas. I would hope that the final impact statement would address the questions of how these problems shall be completely and competently handled. There appears to be no attempt to leave important items from inclusion in the impact statement.

ROV:ph

Attachments



RICHARD (DICK) STONE
SECRETARY OF STATE

STATE OF FLORIDA
Department of State

THE CAPITOL
TALLAHASSEE 32304

ROBERT WILLIAMS, DIRECTOR
DIVISION OF ARCHIVES, HISTORY, AND
RECORDS MANAGEMENT

(904) 488-1480

January 14, 1974

Mr. E. E. Maroney
Chief, Bureau of Intergovernmental Relations
Division of State Planning
725 South Bronough
Tallahassee, Florida 32304

Re: SAI #74-0515-E, Phosphate Leasing on the
Osceola National Forest

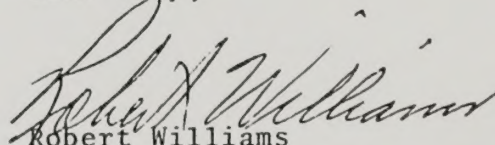
Dear Mr. Maroney:

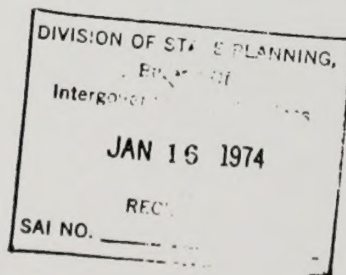
We have reviewed the draft impact statement for the above project and find that it adequately reflects our previous comments. We would like to reiterate that, if the leasing is approved, all property should be subjected to a professional archaeological and historical survey. Such a field reconnaissance could be completed by our agency or by any other professional acceptable to the State Historic Preservation Officer.

It is unfortunate that the stipulations relative to reclamation in the draft statement cannot be applied to cultural resources. Any archaeological or historical site affected by mining operations, should be professionally excavated before land clearing operations begin. It is our opinion that both surveys and excavations should be completed at the lease holders expense. If possible, such a stipulation should be written into lease contracts, in the same way that reclamation bonds must be filed.

The opportunity to comment on this project is appreciated.

Sincerely,


Robert Williams



RW:Mlr



STATE OF FLORIDA
DEPARTMENT OF POLLUTION CONTROL
2562 EXECUTIVE CENTER CIRCLE, EAST
MONTGOMERY BUILDING, TALLAHASSEE, FLORIDA 32301

PETER P. BALJET
EXECUTIVE DIRECTOR

DAVID H. LEVIN
CHAIRMAN

January 16, 1974

Re: SAI 74-0505E
Phosphate Leasing on the
Osceola National Forest

E. E. Maroney
Bureau of Intergovernmental Relations
Division of State Planning
Department of Administration
660 Apalachee Parkway
Tallahassee, Florida 32304

Dear Mr. Maroney:

The subject draft impact statement has been reviewed. The statement appears to be quite thorough and accurate, and it is our considered opinion, based on the information contained therein, that issuance of all preference rights leases will very likely result in substantial degradation of water quality and in a certain reduction in air quality as well. The reasons for this concern are well documented in the draft impact statement, and are in part as follows:

"This runoff (due to land clearing) would increase the potential for erosion, sediment transport and deposition to downstream areas." (p. III-15).

"During storm periods the large amount of exposed soil would increase the potential for soil nutrients to enter stream courses by erosional processes. Eutrophication could occur in slow moving water bodies. Decreased levels of dissolved oxygen, higher temperatures, and greater biochemical oxygen demand levels would occur." "Slime pit-dams in conjunction with ore processing pose a threat of pollution, sedimentation, and flooding in downstream areas should a break occur." (p. III-16).

"The byproduct wastewaters from the production of chemical fertilizers would pollute surface waters The degree of pollution would depend upon the production capacity, waste outputs and waste treatment measures." (p. III-17).

Mr. E. E. Maroney
January 16, 1974
page 2

SAI 74-0505E

"The cone of depression (resulting from pumping make-up water) could induce the upward movement of highly mineralized water from the lower part of the aquifer, contaminating freshwater supplies." (p. III-19).

"In these areas (of porous surface material) it is possible that water and contaminants would infiltrate through the bottom or sides of the ponds and ditches and enter the shallow, the semi-artesian, the Floridan aquifer or all three. Breaks in dikes or dams in tailing or slime ponds may temporarily allow sediment-laden water to enter nearby surface streams or the shallow aquifers." (p. III-20).

"Particulate matter would be emitted during ore processing since 7 percent of total potential, particulate matter escapes the cyclone and gravitational spray tower. Sulfur dioxide could occur as an uncontrolled emission, if dryers utilize sulfur containing fuel and would be emitted from sulfur fuels in calcining." "Obnoxious fumes of SO_2 , SO_3 , H_2S , and H_2SO_4 are emitted during the production of sulfuric acid. Some ammonia is emitted in making ammonia and diammonium phosphates." (p. III-22).

We recommend that the draft environmental impact statement be approved as written, and that the subject leases not be issued.

Sincerely,

Tim S. Stuart

Tim S. Stuart, Ph.D.
Section Administrator
Environmental Support Services

TSS:rcc

Florida



REUBIN O'D. ASKEW
GOVERNOR

Department of Transportation

Haydon Burns Building, 605 Suwannee Street, Tallahassee, Florida 32304, Telephone (904) 488-8772

WALTER L. REVELL
SECRETARY

January 14, 1974

Mr. E. E. Maroney, Chief
Bureau of Intergovernmental Relations
Division of State Planning
Department of Administration
725 South Bronough Street
Tallahassee, Florida 32304

Attention: Mr. Estus Whitfield

Dear Mr. Maroney:

Subject: Draft Environmental Impact Statement Phosphate
Leasing in the Osceola National Forest - Baker
and Columbia Counties
SAI 74-0515-E

We have reviewed the subject statement and have the following comments:

1. The environmental statement is well written and identifies the natural environmental impact adequately.
2. From a transportation point of view, the statement does not give enough information about mining facility operations to assess the impact of increased traffic on area highways, particularly state road 250 and U. S. Highway 441. The additional increase in traffic could overload these facilities and possibly cause a premature failure in road base due to the heavy truck traffic.
3. In view of the Department of the Interior's stringent requirements regarding 4(f) (Federal-Aid Highway Act) involvement, it seems inconsistent that an operation of this magnitude for private interests would be considered in a national forest, when state and federal agencies must initiate and complete

Mr. E. E. Maroney

January 14, 1974

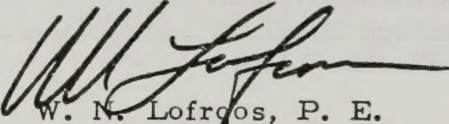
Page 2

minute planning to protect such environmentally sensitive areas.

We appreciate the opportunity to review this statement.

Sincerely,

RAY G. L'AMOREAUX, DIRECTOR
DIVISION OF PLANNING & PROGRAMMING



W. N. Lofroos, P. E.
Chief, Bureau of Planning

WNL/JCK/pc

cc: Mr. J. H. Pitman

STATE OF FLORIDA

DEPARTMENT OF HEALTH AND REHABILITATIVE SERVICES

Prior Notification and Review System

O. J. KELLER

Emmett S. Roberts
Secretary

Date: January 30, 1974

MEMORANDUM:

REF. NO: DHRS _____ SPDC (SAI) 74-0515E

TITLE Draft EIS Phosphate leasing on the Osceola National Forest

APPLICANT U.S. Department of the Interior

TO: Kenneth Ireland, Secretary
Department of Administration
E.E. Maroney,
Attn: ~~Dorothy Spier~~, Chief
Bureau of Intergovernmental Relations
O. J. KELLER

FROM: Emmett S. Roberts, Secretary
Department of Health and Rehabilitative Services

By: Division of Planning and Evaluation

SUBJ: NOTIFICATION OF INTENT TO APPLY FOR FEDERAL FUNDS

The project identified above has been reviewed in accordance with O.M.B.
Circular A-95. Action recommended:

- ☐ The project is consistent with the goals and objectives of the Department of Health and Rehabilitative Services. Favorable action is recommended.
- ☐ Substantive comments have been received and are summarized in the attached.
- ☐ Conference with applicant is requested.
- ☒ The project is not consistent with the goals and objectives of the Department of Health and Rehabilitative Services. Approval is not recommended for reasons described in the attached.

Attachment (s)

STATE OF FLORIDA

DEPARTMENT OF HEALTH AND REHABILITATIVE SERVICES

Prior Notification and Review System

O. J. KELLER

[Emmett S. Roberts]

Secretary

Date: January 3, 1974

MEMORANDUM

REF. NO: DHRS _____ SPDC (SAI) 74-0515E

TITLE Draft EIS Phosphate leasing on the Osceola National Forest

APPLICANT U.S. Department of the Interior

TO: Robert H. Browning, Chief
Bureau of Comprehensive Rehabilitation Planning

FROM: Federal Programs Coordinator, Division of: Planning & Evaluation (CHP/Conger)
The proposal identified above was reviewed by:

J. Barry Mittan, Research Assistant	January 11, 1974
Reviewer's Name and Title	Date Reviewed

Reviewer's Comments: (Use additional sheet if needed)

The Bureau of Comprehensive Health Planning recommends that phosphate mining not be allowed in the Osceola National Forest because of public health, environmental, and energy concerns expressed in the draft environmental impact statement. The reasons for this recommendation can be found in some detail in the environmental impact statement, although the absolute magnitude of the effects of such operations is perhaps not fully detailed. In terms of public health, this project can or will result in several adverse occurrences. These include dewatering of all three stages of the aquifer (shallow, secondary, and Floridian); reduction in the potentiometric surface of the aquifer; reduction of the water recharge capacity of the area; pollution of the aquifer by phosphates and slimes; radioactive contamination of ground water; and release of fluorides into ground and surface water supplies. These particular effects will not only greatly diminish the quantities of drinking water available to the state, but will also greatly degrade the quality of that water - making it impossible to utilize these supplies in some cases. This fact is pointed out in the draft EIS, although the actual danger to the public health is somewhat minimized. It is probable that no amount

of reclamation can satisfactorily eliminate this problem. Another major public health concern is the production of fluorosilicic acid and other similar compounds as a result of mining and processing activities. This has already created a problem in the mining areas in central Florida - a problem which includes not only destruction of plant life and diseased cattle, but also the possibility of fluorosis (a bone disease) in the human population. Fluorosilicic acid air pollution will almost undoubtedly result in the loss of crop acreages and reduction of cattle production in the areas surrounding the mining area due to the disease-causing properties of the acid. This problem is also one which current technology cannot prevent, thus human population of the area will be jeopardized by pollution which cannot be controlled at the present time. The danger to the human and animal population as a result of the consumption of crops impregnated with fluorosilicic acid residues cannot be understated.

The environmental concerns of phosphate mining in the Osceola National Forest can be summed up by stating that if mining is allowed, at least one-third of the environment of the forest will be obliterated. Specific concerns include the following:

- (1) Air pollution, including sulfuric and fluoride compounds, which will result in destruction of plant and animal life over a much larger area than the mining operations, perhaps as much as several miles given prevailing winds. This is not well detailed in the draft impact statement, especially as regards possible danger to humans.
- (2) Total destruction of the land surface. Even reclamation activities will not allow a return to presently existing land conformations.
- (3) Radioactive contamination from the uranium tailings found in slime pits. Although localized in the pits the radioactive pollutants could enter water supplies through percolation or runoff.
- (4) Possible massive contamination of surface water bodies outside the project area through flooding of the mining area which is located in a flood-prone area, breakage of dams holding slimes, or other disasters which would result in the emptying of the contents of slime pits into local rivers, such as the Suwannee, or creeks.
- (5) Pollution of water bodies outside the project area through runoff and erosion from the mining operations. The extent of this pollution is not known.
- (6) Pollution of ground water supplies through percolation and direct pollution from breaks in the aquifer resulting from the mining.
- (7) Eutrophication of surface water bodies within and surrounding the project area as a result of an increased concentration of phosphates and higher

water temperatures.

- (8) Removal of habitat for several rare and endangered species of both plants and animals including the alligator, black bear, Florida panther, red cockaded woodpecker, sandhill crane, bald eagle, manatee, Suwannee bass, peregrine falcon, orchids, ferns, red bud, dogwood, loblolly bay, American holly, wild azealea, and pitcher plants. Deer, turkey, squirrel and other game populations will also be reduced by the project. Total loss of rare and endangered species will probably be considerable in terms of percentage of existing individuals.
- (9) Alteration of the drainage basin for the entire area as a result of the elimination of existing swamps and bays, interruption of creeks and streams, and the lowering of the aquifer due to heavy use. This could result in significant damage throughout the region - a problem not completely discussed in the draft Environmental Impact Statement.

Phosphate mining operations are among the most destructive of all land uses. Such operations result in air pollution, water pollution, erosion, destruction of land areas, elimination of plant and wildlife communities, and radioactive contamination. The proposal to subject one-third of the Osceola National Forest to such mining goes against every environmental protection measure yet conceived. In fact, the proposal is in direct conflict with the objectives of the National Environmental Policy Act of 1969 and Forest Service policies for the management of national forests. Among the objectives with which this proposal is in direct conflict are those which direct the Forest Service to:

- (1) Protect and improve the quality of air, water, soil and natural resources (Phosphate mining degrades the quality of all these resources.)
- (2) Protect visitors to insure their enjoyment of the National Forest. (Contamination of ground water supplies and fluorosilicic acid pollution does not protect the forest visitor.)
- (3) Manage all resources and activities on the National Forest to minimize impacts on soil and water. (Mining activities will totally alter the conformation of the land and water bodies and significantly change their uses.)
- (4) Develop and maintain a pattern of wildlife and fish habitats that will best meet the needs of the people now and in the future. (This project will destroy the wildlife and fish habitats in one-third of the forest.)
- (5) Plan and administer the utilization of natural resources in such ways that the resulting effects will minimize impact on the visual resource. (Phosphate mining will result in a contrast rating of 21-30, a change so drastic that it cannot be overlooked and thus demands attention.)
- (6) Protect wet lands. (All wetlands in the mining area will be destroyed.)
- (7) Protect aquifer recharge areas from activities that would lower water levels in the aquifer or cause pollution.

(Phosphate mining activities will reduce the aquifer level by several feet, prevent recharge, and pollute all three levels of the aquifer.)

- (8) Be responsive to public and private needs for National Forest lands and resources through their authorized occupancy and use. Allow such uses only on lands suitable for that use, and under conditions which protect the public interest including the proper consideration of environmental quality and landscape integrity. (Not only is the environment heavily damaged, but the landscape itself is significantly altered by mining activities.)
- (9) Manage mineral activities in accordance with the principles of multiple use with maximum concern for wise use and conservation of the resource; minimizing disturbance of the surface and providing for reasonable restoration. (Phosphate mining will obliterate the existing surface environment to such an extent in some areas that reclamation will not be possible for decades).

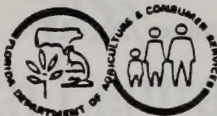
The mining operations will also adversely effect hunting and other recreational uses of the forest, not only by diminishing the wildlife population and denuding thousands of acres, but also by causing a substantial loss in the aesthetic qualities of the environment. Recreational values in terms of the peace and quiet of natural forest surroundings will be eliminated by the presence of phosphate mining operations. In addition, one-third of the recreational land area of the forest will be completely unusable for decades during and after the mining operations. Since this is one of the few recreational areas in the northeast portion of the state and the only public hunting area in this region, this will have a major impact on a major public activity - recreation.

Mining will also destroy historical areas in the forest, both known and as yet undiscovered areas. This may result in a significant scientific loss.

As for energy, 400 million KWH will be required to operate the processing facility. Given the current energy shortage and the possibility of power blackouts resulting from this operation, disapproval of this project seems to be indicated. The energy crisis may in fact prevent the use of 400 million KWH by the processing facility, in which cases the mining would be useless.

With the existence of all of these concerns and the conflicts between the planned use of the forest and Forest Service objectives, it is the recommendation of this bureau that phosphate mining not be allowed in the Osceola National Forest. If this recommendation is not followed BHP recommends that the environmental impact statement be expanded to cover the areas indicated in this review - delineating effects both in the mining area and on the surrounding region and that strict requirements be placed upon the lessee - requirements which would alleviate the massive environmental destruction and public health danger which would result from this project. The requirements should

provide for immediate termination of mining and complete re-
restoration of the project area should the danger to the public
health or the surrounding environment exceed a reasonable level.



FLORIDA DEPARTMENT OF AGRICULTURE & CONSUMER SERVICES

DOYLE CONNER, COMMISSIONER
FM

*

DIVISION OF FORESTRY

/

COLLINS BUILDING

/

TALLAHASSEE 32304

Res. Dev.

E.I.S.

January 30, 1974

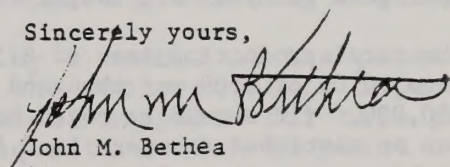
Director, Eastern States Office
Bureau of Land Management
7981 Eastern Avenue
Silver Springs, Maryland 20910

Dear Sir:

At the public hearing in Tallahassee concerning the proposal to mine phosphate on the Osceola National Forest in Florida, a reference was made by the undersigned to the effect that this could result in an estimated gross national product loss of some six billion dollars in the area of forest products. I was asked to provide you additional information showing the basis for this estimate. Attached is an addendum which has been prepared detailing this information.

We appreciate the opportunity to provide these additional statistics.

Sincerely yours,


John M. Bethea
Director

Attachment

January 30, 1974

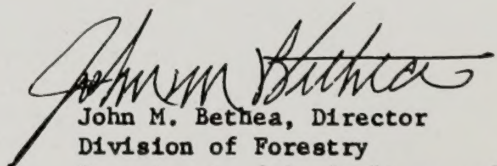
Computation of Income Loss as a Result of Timber Growth
Losses That are Estimated to Result Should Phosphate Leasing
Occur on the Osceola National Forest

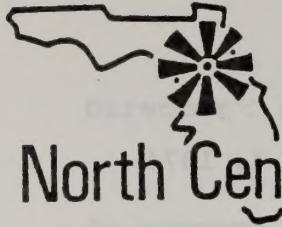
This addendum is prepared on request of the Department of the Interior to show how an estimated six billion dollars loss in Gross National Product was arrived at in the Florida Division of Forestry statement made at the Department of the Interior Public Hearing, January 21, 1974, Tallahassee Florida.

This is based on a preference right lease arrangement that will permit mining of 52,000 acres on the Osceola National Forest.

Assumptions are as follows:

1. At least 39,000 acres of forestland will be permanently disturbed - 9,000 acres will be permanently lost to lakes and will result in a total loss of future forest growth in perpetuity.
2. An additional 30,000 acres will be mined and reduced in productivity at the rate of 200,000 board feet annually per thousand acres mined for an indefinite future period. This calculation uses 300 years as an assumed recovery period. Growth loss here is 6 million board feet annually.
3. Total production loss from the 9,000 acres is estimated to have an average Site Index of 75. Growth loss for 50 year rotations would average 278 board feet per acre per year or, roughly 2.5 million board feet.
4. The total production loss of 8.5 million board feet has an average current stumpage value of \$100 per thousand board feet. Stumpage value loss annually is \$850,000. (It should be noted here, parenthetically, that the 20 year appreciation on sawtimber stumpage is 8.5% annually).
5. One dollar of stumpage ultimately produces \$25 in Gross National Product. Total annual loss in Gross National Product is 21.25 million dollars.
6. For the projected 300 year period the loss in Gross National Product, without recognizing an appreciation in stumpage rate annually, is \$6,375,000,000.


John M. Bethea, Director
Division of Forestry
Department of Agriculture and
Consumer Services



North Central Florida Regional Planning Council

5 SW SECOND PLACE, GAINESVILLE, FLORIDA 32601 • TELEPHONE 376-3344 • CHARLES F. JUSTICE, EXECUTIVE DIRECTOR

February 4, 1974

Director, Eastern State Office
Bureau of Land Management
7981 Eastern Avenue
Silver Springs, Maryland 20910

RE: Public Meeting in Lake City, Thursday, January 17,
1974, Concerning Phosphate Mining Leasing in the
Osceola National Forest, Florida

Dear Sir:

At the meeting noted above, I took the opportunity of making several personal comments concerning phosphate mining in the Osceola National Forest. My comments at that time centered around the apparent lack of equally valuable areas which could be obtained in the vicinity of, or contiguous to, the Osceola National Forest which would serve in lieu of those lands lost as a result of mining. Communications with other individuals knowledgeable of that area of the State since that time have lent support to the information we have previously acquired.

At that meeting, I was requested by a member of the panel to submit my comments concerning the socio-economic impact of the environmental impact statement prepared for this public hearing. In honoring that request, I wish to point out that the North Central Florida Regional Planning Council has not reviewed nor taken a stand on the proposed mining operation and the brief comments following must, therefore, be personal in nature.

As indicated in the impact statement, an estimated 400 new workers would need to be drawn from outside the immediate area. With their families this would cause an influx of approximately 1200 - 1500 people to the Lake City area representing an 11 - 14% population increase. Added to this would be the population to provide support services for the new people which by rule of thumb would cause a total population increase of 20% to Lake City. By any standards, this short term increase could be expected to have substantial impact

upon the ability of local services to meet the demands of this new population. For example, the impact statement points out the present lack of adequate power in that area. The social and economic impact on power requirements for both the new population and industrial requirements is by no means short term. In light of the present energy shortage, this requirement alone would potentially cause a substantial deterioration in the quality of life as we know it to this area for perhaps as long as five to eight years.

One further example of the impact on public facilities would be the generation of approximately four tons per day of additional solid waste requiring collection and disposal. This would entail at least two additional packer trucks to collect this waste each week and an added landfill capacity of nearly 100 cubic yards of additional solid waste to be disposed of weekly. The report indicates that housing needs will probably be fulfilled by mobile homes, which without adequate land use controls could result in temporary mobile home parks which might be hurriedly designed and built without adequate planning, sanitation improvements or esthetic considerations. This situation may, of course, never arise; however, as evidenced by the reluctance of these rural counties to develop land use or subdivision regulations in connection with large scale mining interests and spot developments in other areas of these respective counties, such developments could possibly take place. The primary point, however, is that the influx of 400 - 500 workers with their families and with their need of support services would cause a significant economic impact on the immediate area of Lake City. The degree of impact would depend on how this growth took place over time. In addition, from a rural view-point, it should be pointed out that a possible adverse social impact might be great enough to local residents and those contemplating a rural life, to discourage that building and development, which would otherwise take place. These factors and impacts are further magnified by the intent to mine even larger areas in the same area on private lands.

Drawing from information provided by the North Central Florida Health Planning Council, it appears that this development should cause no undue hardship with Health facilities or personnel. This is due in part to the excellent health facilities in Lake City and also by the relative proximity of Jacksonville by the major thoroughfare I-10.

Director

-3-

February 4, 1974

In summary, on a strictly economic basis it is questionable that the gain would outweigh the losses even on a short term basis. This would be extremely doubtful over the long term. The degree of social impact could vary with the timespan in which this growth would take place, as well as the adequacy and quality of the provisions made for this expansion.

I hope that these few personal comments will aid you in making a decision concerning phosphate mining in the Osceola National Forest.

Sincerely,

Alan L. Csontos

Alan L. Csontos
Environmental Planner

ALC:mjc

a l a c h u a a u d u b o n s o c i e t y

P. O. BOX 13307 • Gainesville, Florida 32601

January 14, 1974

STATEMENT: For the Hearing on the Draft Environmental Impact Statement
on Phosphate Leasing in the Osceola National Forest, Lake
City, Florida January 17, 1974

The Alachua Audubon Society is opposed to the leasing of land for
phosphate mining in the Osceola National Forest for the following reasons:

1. The phosphate on this land is not presently needed and is an insignificant amount in long term needs. There are huge supplies on private lands in Florida and other states.
2. The present mining and processing techniques are crude and extremely wasteful of both the environment and the phosphate, not to mention the fluorine and uranium in the ore.
3. The present use of phosphate in this country is extravagant and we are still squandering our supplies by exporting them to other countries at very low prices.
4. Large scale environmental damage would result from mining and processing this deposit which is on public land dedicated to other public uses.

Timber Losses Ten to twelve thousand acres of privately owned forest land would be destroyed to hold the slimes produced from the National Forest mines. In addition, 9000 acres of National Forest land would be permanently deforested, and about 20000 acres would be mined and reclaimed with questionable value as commercial forest land. The net effect of this is to take out of production permanently 20000 acres of the nation's best timber land, and to take out of production for an undetermined period of time another 20000 acres which would eventually be reclaimed,

a l a c h u a a u d u b o n s o c i e t y

P. O. BOX 13307 • GAINESVILLE, FLORIDA 32601

Statement; Osceola National Forest Page 2

but at perhaps less than $\frac{1}{2}$ of its original productivity. This comes at a time when timber supplies are becoming critically short, driving prices sky high, and endangering the timber industries which provide much of the Southeast's stable economic base. An additional decrease in forest productivity on lands surrounding the processing site(s) for many miles could result from fluorine pollution.

Water Losses The first step in the proposed mining would be a large scale drainage project resulting in a general lowering of the water ^{and} table, wasting of Florida's precious fresh water supply. Pollution and silting of the Suwannee River and several tributary creeks would also occur during mining, and phosphate pollution of the river would continue after reclamation. The mining and processing consume large quantities of water, much of which could not be reclaimed, thus further lowering the water table.

Soil Losses After draining, the next step in the mining process is to scrape all the "plant debris and muck" (along with some of the best part of the topsoil) into windrows which are later buried at the bottom of the mined-out pits under overburden. The wildlife which has managed to survive in the windrows will be completely obliterated by this step, and the soil inexcusably wasted. The remaining soil, even with the best attempts at reclamation, is crushed, homogenized, and subjected to erosion. To destroy 20,000 acres of highly productive soil and severely damage another 20,000 acres cannot be justified in this case.

Wildlife Losses The value of providing a refuge for six endangered species cannot be offset by a need for this particular deposit to be

a l a c h u a a u d u b o n s o c i e t y

p. o. BOX 13307 • Gainesville, Florida 32601

Statement: Osceola National Forest Page 3

mined. With much of the eastern coastal plain underlain with phosphate ore, ample sources are available. This is not true for refuge area for such wide-ranging species as the Florida panther and the black bear, or specialized species like the red-cockaded woodpecker.

In summary, on the basis of information available from the draft environmental impact statement, the Alachua Audubon Society believes that the cost in environmental damage to the Osceola National Forest far outweighs any benefit to the public from the leasing of this land for mining. We further believe that leasing of public land for the benefit of any private industry should cease as not being a benefit to the owners of the land - the people of the United States.

Robert W. Simons

Mrs. C. Ian Hood, President

Please enter this statement in the Hearing Record.



Environmental Action Group

323 REITZ UNION, UNIVERSITY of FLORIDA
GAINESVILLE, FLORIDA, 32601, PHONE 392-1635

February 6, 1974

Bureau of Land Management
Eastern States Office
U.S. Department of the Interior
798 1/2 Eastern Avenue
Silver Springs, MD 20910

Dear Sir,

During my testimony at the Osceola National Forest hearings held in Lake City in January, I was asked how many people from the University of Florida and my organization used the forest. At that time I did not know but have since run a notice in the campus paper asking people interested in the Osceola to respond. I received 139 written responses and a smaller, uncounted number of verbal ones. These can be added to more than 200 members of EAG who have used the forest or plan to use it. Enclosed are the responses I received.

I also told the panel I would try to determine the value of the wetlands to be destroyed by the phosphate stripping. This I was unable to do because of lack of exact enough information. However, if someone working on the impact statement wishes to do this, they should contact the Wetlands Laboratory through the Environmental Engineering Department at the University of Florida.

Sincerely,

Paula Christy Smith
Paula Christy Smith, director

February 13, 1974

Reference: Paula Christy Smith's letter dated February 6, 1974.

Documentation: One hundred and thirty-nine (139) written and signed/dated newspaper notice responses to the effect

I am opposed to strip mining the Okeola National Forest for phosphate because it will destroy the environment, harm the Suwannee and make the forest less desirable for recreation.

name Cheryl Wilson

address 1209 NW 43 Ave

were received by the Eastern States Office, Bureau of Land Management, 7981 Eastern Avenue, Silver Spring, Maryland 20910. These will be kept on file and are available for public inspection.

John L. Carlson 2/13/74
Division of Resources and
Environmental Management



FLORIDA DEFENDERS OF THE ENVIRONMENT, INC.

P. O. Box 12063

Gainesville, Florida 32601

25 January 1974

STATEMENT ON DRAFT ENVIRONMENTAL IMPACT STATEMENT, PHOSPHATE LEASING IN THE OSCEOLA NATIONAL FOREST

Prepared by: Edna Loehman, Ph.D, Natural Resource Economist,
Assistant Professor of Food and Resource Economics, University
of Florida, Gainesville, and co-chairman of Economic Advisory
Committee, Florida Defenders of the Environment.

The Environmental Impact Statement, though being one of the most clear and complete such statements that I have seen lacks specific calculations of economic benefits and costs of phosphate mining in the Osceola National Forest. Furthermore, it lacks calculations of benefits and costs for each of the various alternatives to mining in the Forest. Once benefits and costs are determined for each alternative, the alternatives may be compared and the one with the most beneficial effects and least detrimental effects chosen. As set forth in the recent Water Resources Council's recommendations, such comparisons are necessary in order to make rational decisions about resource use.

The amount of phosphate to be removed by mining in the Osceola is about 80 million tons at a value of \$70 per ton or about one half billion dollars. However, since the phosphate involved is only about 1/20th of current estimated Florida reserves, this same one-half billion dollars, which represents the direct economic benefits from mining, could be obtained from developing alternative sources. If alternative sources were developed instead of the Osceola, some additional costs of production would be incurred because lease costs would presumably be higher than that charged by the Federal Government. Theoretically, this increase in cost could affect the price of phosphate to the farmer and hence affect the price of food. However, since the amount of phosphate involved is small relative to that available from non-National Forest sources, this price effect would be inconsequential. The only effect would be to lower profits to the mining firms seeking to obtain leases in the Osceola but such profit effects do not enter into benefit-cost calculations. Thus, the direct economic benefit of developing alternative mining sources would be the same as from mining the Osceola.

The economic cost of mining in the Osceola must be considered and compared to costs for alternative sources. Economic cost includes the cost of inputs to develop the resource, the opportunity costs associated with development, and costs due to external effects such as pollution. Except for differences in the cost of the leases and mining regulations, costs of inputs should be about the same whether mining is done in the Forest or elsewhere.



FLORIDA DEFENDERS OF THE ENVIRONMENT, INC.

P. O. Box 12063

Gainesville, Florida 32601

However, depending on what alternative mining site is considered, there will be a difference in opportunity costs, the value of foregone opportunities for use of the resource. For example, the opportunity cost for mining on ranch land in Manatee County would be the value of grazing land which is given up and the value of water which is diverted from agricultural to mining uses. In the case of the Osceola, opportunity costs are based on the value of losses to recreation and forestry as well as agriculture. Nonmonetary losses to the environment in the form of destruction of unique wildlife species and habitat are also involved.

In the area of recreation, the Osceola provides hunting, camping, hiking, fishing, and nature study opportunities. The Impact Statement estimates that mining would reduce hunting by a third and other activities by a fourth. It is possible to obtain estimates of the value of a recreation day and thus put dollar measures on these losses. At a value of \$20 a recreation day, this loss would amount to a million dollars a year. Since Outdoor Recreation in Florida reports a deficit for the year 2020 in the amount of recreational land available in the counties surrounding the mining area, the value of a recreational day in the Forest will rise as growing population, education, income and lack of fuel to travel elsewhere cause more and more people to seek to recreate in the forest.

Losses due to reduction of forest activities on the 28,000 acres to be mined can also be calculated. Using the figures in the Impact Statement (III-35) and average values for rough cut at the mill of \$225 per 1000 board foot of pine, \$550 per board foot of hardwood, and \$30 per cord of pulp, an annual value of \$1.5 million dollars of forest products would be lost. (The loss would be even higher if calculated in terms of retail value.) It should be noted that timber, as well as phosphate, is becoming more valuable as demand increases and supply dwindles.

In agriculture, there would be losses equal the cost of leasing or purchasing alternative grazing areas. Another opportunity cost would be due to the use of water for mining (20 million gpd) that could otherwise be used for agricultural and other purposes. These costs could be the same whether the Forest or nearby land was used for mining.

Pollution is another source of direct cost to society. Pollution would be caused by phosphate slimes whether mining was in the Forest or elsewhere. However, pollution damages would be higher in the Forest due to loss of unique features than in an area such as grazing land in Manatee County. Losses to water quality due to salt water intrusion and pollution of the aquifer also have economic value which need to be assessed. These losses could be lessened or averted by mining in a less sensitive area.

Although I have mentioned several areas where it is possible to measure economic losses, there are many losses due to mining in the forest which are difficult to measure in monetary terms. Such nonmonetary losses would occur to wildlife habitat, psychic and aesthetic values, and psychological losses. Our society does value these losses even if they are not in monetary terms.



FLORIDA DEFENDERS OF THE ENVIRONMENT, INC.

P. O. Box 12063

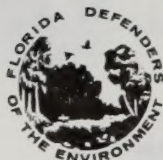
Gainesville, Florida 32601

One measure of loss in value of the Forest which would include non-monetary factors would be the cost of purchasing land to replace opportunities lost on the Forest land. Buying land in Florida is now a costly proposition--at \$2,000 an acre, \$56 million dollars for 28,000 acres. It is unlikely under present circumstances that either the State or the Federal Government would spend this amount to replace forest, wildlife, and recreation lands. If there is no similar land available for recreation, wildlife, and forestry, then the loss is taken to be infinite. It would be far easier to find alternative phosphate sources than to find alternative forest resources. The cost of restoring the mined Forest land to its original state, another measure of economic loss to the Forest, would also be infinite since no method is available at this time to settle phosphate slimes and as the report repeatedly states, there is little likelihood that the swamp hardwood areas could be regenerated.

Some indirect benefits mentioned in the Impact Statement due to mining would be the creation of about 500 semi- and unskilled job opportunities for a low income area. Not mentioned in the report were the magnitude of losses in forestry-related jobs in the five companies who get timber from the Osceola National Forest. The report also does not indicate the magnitude of economic costs to the communities for providing services to new residents. Such costs would occur from any type of industrial development, including development of alternate phosphate sources, but some other types of development could result in larger income and employment multipliers for the area. Mining is among the industries with the lowest income and employment multipliers.

Economic principles give that the least costly sources of resources should be developed first and the most costly developed last. This statement has tried to indicate that development of sources of phosphates other than in the Osceola National Forest would yield virtually the same economic benefits with lower opportunity and pollution costs. Such alternative sources should be developed first. Not only should use of the Forest for mining be postponed indefinitely because of the high costs involved but also because such postponement would allow time to develop technology to remove phosphate from slime thereby reducing pollution and recovering more of a scarce resource. Agricultural technologies which use phosphate less intensively or recover unused phosphate could also be developed. As the price of phosphate rises with increasing scarcity, such technologies will become economically feasible. It could be that with such technologies, we may never need to mine in the Forest.

We can always decide to mine in the Forest at a later time if the need is justified but we can never restore the Forest once it has been destroyed. I favor denying the issuance of phosphate leases in the Forest since this option allows the most flexibility for future resource-use decisions.



FLORIDA DEFENDERS OF THE ENVIRONMENT, INC.

P. O. Box 12063

Gainesville, Florida 32601

References

1. A. R. Prest and R. Turvey, "Cost-Benefit Analysis: A Survey,"
Surveys of Economic Theory III, Macmillan, London, 1966.
2. U. S. Water Resources Council, "Water and Related Land Resources,
Establishment for Principles and Standards for Planning,"
Federal Register 38, September 10, 1973.

R. L. Eikum
Box 343
DeLand, Fl. 32720
January 15, 1974

Director
Eastern States Office
Bureau of Land Management
7981 Eastern Ave.
Silver Springs, Maryland 20910

Dear Sir:

Enclosed you will find a resolution from the Florida Foundation for Future Scientists calling for protection of those areas which are unique in the Osceola National Forest.

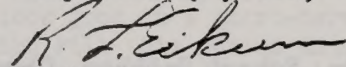
Please incorporate this into the written comments on the draft statement.

Inasmuch as there has been a change in chairman of the board for this organization it should be noted that future draft statements should be sent to:

Dr. Robert Gaither
Chairman of the Board
Florida Foundation for Future Scientists
% Dept. Mechanical Engineering
University of Florida
Gainesville, Fl. 32601

If it is within keeping, I would like to remain on the list as an interested citizen.

Respectfully yours,


R. L. Eikum
Past Board Chairman
Florida Foundation for
Future Scientists

CC: Dr. Gaither

January 13, 1974

WHEREAS the Florida Foundation for Future Scientists is charged by the Legislature of the State of Florida with seeking out and encouraging science talent among the youth of Florida;

And WHEREAS areas of unique flora and/or fauna may contribute materially to this end;

And WHEREAS areas of unique geomorphological, hydrological and geological characteristics may also contribute materially to this end;

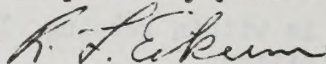
And WHEREAS scientists of today and the scientists in training in perpetuity will require such natural system laboratories;

WE NOW THEREFORE urge that such areas be set aside as scientific study areas and as such be removed from utilization. We further recommend that such areas be used under a permit system to be administered by the U. S. Forest Service and that said agency distribute a list of such areas to the various colleges and universities in Florida and adjoining states as well as to the Florida Foundation for Future Scientists.

And FURTHERMORE it should be noted that values pertaining to such use may, in the future, outway the one time economic worth of the product which might be removed.

This statement is presented on behalf of the Florida Foundation for Future Scientists upon instructions from Dr. Robert Gaither, Chairman of the Board.

Respectfully submitted,



R. L. Eikum

(Past Board Chairman)

Member of Executive Committee

Fl. Foundation for Future
Scientists

CC: Dr. Robert Gaither, Chrm.
Dept. Mechanical Engineering
University of Florida
Gainesville, Fl. 32602

FLORIDA TRAIL ASSOCIATION, INC.

33 S. W. 18TH TERRACE, MIAMI, FLORIDA 33129

(305) 371-6776

President

JAMES A. KERN

January 25, 1974

Vice-President

ALDEN G. STONE

Secretary-Treasurer

CAROLYN M. KERN

Directors

ROBERT COLWELL
WILLIAM S. CRAIG
MAURICE M. DILIBERTO
INEZ FRINK
CAROLYN M. KERN
JAMES A. KERN
DOROTHY LAKER
R. RYAN MAXWELL
THOMAS B. MONTROYA
FRED W. MULHOLLAND
HARRIS I. POMERANTZ
MARGARET K. SCRUGGS
ALDEN G. STONE
SELMER UHR

Section Leaders

W. ALLAN CAMPBELL
JAMES A. KERN
CECIL E. KIRKHAM
DOROTHY LAKER
R. RYAN MAXWELL
FRED W. MULHOLLAND
BERNARD MYERS
ROBERT ORWIG
M. S. POWERS, JR.
MARGARET SCRUGGS
SELMER UHR

Activities Chairman

INEZ FRINK

Cartographer

FRED W. MULHOLLAND
ALDEN G. STONE

Legal Adviser

MAURICE M. DILIBERTO

Advisory Board

KENNETH C. ALVAREZ
ROBERT B. DOUGLASS
BENJAMIN MCPHERSON
LEWIS D. MILLEDGE, JR.
DADE W. THORNTON

Honorary Charter Members

ROSS ALLEN
CHARLES M. BROOKFIELD
ARCHIE CARR
ALLEN D. CRUICKSHANK
MARJORY STONEMAN DOUGLAS
O. E. FRYE, JR.
ARTHUR R. MARSHALL
C. RUSSELL MASON
N. E. BILL MILLER
KENNETH D. MORRISON
POLLY RESFORD
DADE W. THORNTON
FREDERICK K. TRUSLOW

Director, Eastern States Office
Bureau of Land Management
7981 Eastern Avenue
Silver Springs, Maryland 20910

Dear Sir:

The Florida Trail Association is an organization of about 5000 members which seeks to provide greater opportunity for the public to enjoy the natural environment through hiking and canoeing. As such, we spend a good deal of time in the out-of-doors, and are, therefore, interested in an attractive outdoor recreational experience. Our organization's goal is to develop a 700 mile hiking trail the length of Florida. To date, we have completed about 225 miles including 22 miles in the Osceola National Forest. Needless to say, the proposed strip mining would wipe out the experience of traveling through a primitive environment where we can test our outdoor skills, and derive a strong sense of accomplishment.

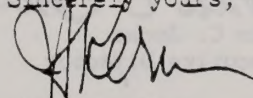
But the loss of a quality hiking location is only one of many losses that would follow strip mining. We believe that mining would utterly destroy the one-third of the Osceola National Forest involved, eliminating the multiple use of renewable resources for which it is managed.

We seriously question whether large-scale restoration of the land is possible on an economic basis. We know there are a few examples where small-scale restoration of mined areas for uses such as home sites, pasture, etc. has been accomplished. But what will the cost be of large-scale restoration involving thousands of acres? Will it be possible to require such expenditures when a natural setting of trees providing normal forest uses is the desired goal?

Finally, we question the depletion of our phosphate reserves for export purposes. While phosphate exports look good on a short-term balance of payments analysis, what position will this put us into when our reserves are depleted for our own use? Will we be able to import this vital supplement to American agriculture at a reasonable price? What will happen if foreign governments use phosphate as a form of political blackmail as in the present oil embargo?

We feel the present impact statement does not adequately answer these important questions.

Sincerely yours,



James A. Kern

FLORIDA WILDLIFE FEDERATION

AFFILIATED WITH NATIONAL WILDLIFE FEDERATION

4080 NORTH HAVERHILL ROAD, WEST PALM BEACH, FLORIDA 33407

PHONE: (305) 683-2328

Executive Director

JOHN C. JONES



President

CALVIN R. STONE
18145 S.W. 95th Court
Miami, Fla. 33157
(305) 233-4296

January 15, 1974

1st Vice President

JOHN P. DICKS
2803 Loran Drive, East
Jacksonville, Fla. 32216
(904) 733-4403

P. D. Leonard, Director
Eastern States Office
Bureau of Land Management
7981 Eastern Avenue
Silver Springs, Maryland 20910

2nd Vice President

C. RICHARD TILLIS
2812 Roscommon Drive
Tallahassee, Fla. 32303
(904) 385-3984

Dear Mr. Leonard,

Secretary

OMAS MORRIS
2785 Marbill Road
West Palm Beach, Florida 33406
(305) 683-5740

I would like to take this opportunity to thank you for the copy of the draft environmental impact statement on the proposed phosphate leasing on the Osceola National Forest in Florida. Some of the members of the Florida Wildlife Federation will be taking advantage of the opportunity to make personal comments during the hearings in Florida. We commend your office for giving the public maximum opportunity for comment by scheduling the hearings in several locations.

Treasurer

J. L. NIPPER
7302 S.W. 117th Avenue
Miami, Fla. 33156
(305) 271-2511

Region 1 Directors

HERB ALLEN
1801 Pasadena Drive
Dunedin, Florida 33528

DOROTHY SAMPLE
200 Sunset Drive
St. Petersburg, Fla. 33707

Region 2 Directors

PETER V. JANNOTTI
5153 Bilken Drive East
Jacksonville, Fla. 32210

STEWART B. DOWLESS
7010 Ricker Road
Jacksonville, Fla.

Region 3 Director

W.W. GLENN
P. O. Drawer 698
Marianna, Fla. 32446

W.D. CHILDERS
P. O. Box 3327
Pensacola, Fla. 32506

Region 4 Directors

WALTER G. BRANDON
2321 Fairway Drive
West Palm Beach, Fla. 33401

B. L. PRATT
3000 S.W. 120th Road
Miami, Fla. 33165

Region 5 Directors

BOB HOPWOOD
8765 New Haven Avenue
West Melbourne, Fla. 32901

CHARLIE HARRIS
Box 462
Bushnell, Fla. 33513

Directors-at-Large:

WILLIAM M. BLAKE
JAMES B. WINDHAM
NICK FALLIER
OGDEN M. PHIPPS
MURRAY OVERSTREET

Attached to this statement is a copy of a resolution which was passed by the Florida Wildlife Federation during the annual meeting in September, 1971, which opposes the proposed phosphate leasing in the Osceola National Forest. Our position remains unchanged.

Even though some questions have been raised concerning the environmental pollution which could occur during phosphate mining operations, the general philosophy of the FWF reflects the opinion that insofar as possible, public areas should be protected from commercial enterprises. We believe the recreational value of our forests far out weigh the economic advantages to be derived from such leases. At the same time, we do recognize selective cutting of our forests as sound forestry management.

We ask that the Osceola National Forest's population of wildlife, including bear, bald eagle, alligator, and red cockaded woodpecker receive consideration in the final decision before any lease is granted. Because of Florida's rapidly increasing population, the FWF beleives the recreational and wildlife values in the Osceola National Forest should preclude the issuance of phosphate leases in the Forest.

Thank you for the opportunity to comment.

Very truly yours,

John C. Jones
Executive Director

FLORIDA WILDLIFE FEDERATION

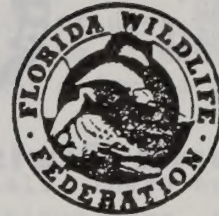
AFFILIATED WITH NATIONAL WILDLIFE FEDERATION

4080 NORTH HAVERHILL ROAD, WEST PALM BEACH, FLORIDA 33407

PHONE: (305) 683-2328

Executive Director

JOHN C. JONES



President

CALVIN R. STONE
18145 S.W. 95th Court
Miami, Fla. 33157
(305) 233-4296

1st Vice President

JOHN P. DICKS
2803 Loran Drive, East
Jacksonville, Fla. 32216
(904) 733-4403

2nd Vice President

C. RICHARD TILLIS
2812 Roscommon Drive
Tallahassee, Fla. 32303
(904) 385-3984

Secretary

OMAS MORRIS
2785 Marbill Road
West Palm Beach, Florida 33406
(305) 683-5740

Treasurer

J.L. NIPPER
7302 S.W. 117th Avenue
Miami, Fla. 33156
(305) 271-2511

Region 1 Directors

HERB ALLEN
1801 Pasadena Drive
Dunedin, Florida 33528

DOROTHY SAMPLE
200 Sunset Drive
St. Petersburg, Fla. 33707

Region 2 Directors

PETER V. JANNOTTI
5153 Bilken Drive East
Jacksonville, Fla. 32210

STEWART B. DOWLESS
7010 Ricker Road
Jacksonville, Fla.

Region 3 Director

W.W. GLENN
P. O. Drawer 698
Marianna, Fla. 32446

W.D. CHILDERS
P. O. Box 3327
Pensacola, Fla. 32506

Region 4 Directors

WALTER G. BRANDON
2321 Fairway Drive
West Palm Beach, Fla. 33401

B.L. PRATT
3000 S.W. 120th Road
Miami, Fla. 33165

Region 5 Directors

BOB HOPWOOD
3765 New Haven Avenue
West Melbourne, Fla. 32901

CHARLIE HARRIS
Box 462
Bushnell, Fla. 33513

Directors-at-Large:

WILLIAM M. BLAKE
JAMES B. WINDHAM
NICK FALLIER
OGDEN M. PHIPPS
MURRAY OVERSTREET

WHEREAS The Osceola National Forest contains the Osceola Management Area of the Florida Game and Fresh Water Fish Commission,

WHEREAS The Osceola National Forest is one of the three areas in Florida which has managed bear hunting,

WHEREAS The Osceola National Forest is public land and has a population of endangered species including the bald eagle, alligator, panther and the red cockaded wood pecker,

WHEREAS The Osceola National Forest is a very productive timber area which is of vital importance to the nation's economy,

THEREFORE BE IT RESOLVED The Florida Wildlife Federation opposes the issuance of preferential rights leases permitting phosphate mining in our Osceola National Forest.

DONE AND RESOLVED the 26th day of September, 1971, in Winter Park, Florida.

Resolution presented by Dr. O. E. Frye, Jr., Director of the Florida Game and Fresh Water Fish Commission.

CERTIFIED
MAIL



Indiana Division

February 5, 1974

Director
Eastern States Office
Bureau of Land Management
Department of Interior
7981 Eastern Avenue
Silver Spring, Maryland

Gentlemen:

The subject DES has been received February 1, after letter and telegram requests, including request that hearing record be held open pending our review of the DES and comment thereupon.

The Indiana Division, Izaak Walton League of America, is a subdivision of the national Izaak Walton League of America, and includes 6,300 members in 50 chapters throughout the state of Indiana. The interests of this organization include most questions dealing with the total ecosystem, and the inter-relationships and mutual effects between man, his activities, and his surroundings. While the interest of our Indiana organization is directly traceable to a controversy in the State of Indiana--that is, our support of the state's phosphate control law barring use of phosphates in laundry detergents, this statement also encompasses our broader environmental interests.

If the mining leases for the Osceola National Forest are issued, 28,000 acres (approximately 18% of the entire Forest) will be totally altered with total effects on the present ecosystem.

The Indiana Izaak Walton League opposes the issuance of any of the mining permits. The DES shows no case that phosphate deposits are needed from the Osceola at this time. Indeed, it acknowledges that fully two-thirds of the phosphate deposits in the affected formations are outside the National Forest. The DES observes that delaying issuance of the permits to mine may only forestall the time at which they will have to be granted. This contention, however, ignores the fact that even if the contention is valid, the Forest will continue to produce the economic wealth in renewable resources during the delay period. Loss of this economic value should be unacceptable until a clear case has been made that the Osceola phosphates are imminently needed.

The proposal to issue the mining permits at this time appears to be a clear violation of the statutory authority under which all but 40 acres of affected Forest land were acquired and managed: namely, the Weeks Act, which authorized acquisition for timber production and watershed protection--both of

The Izaak Walton League of America

INCORPORATED
DEFENDERS OF SOIL, WOODS, WATERS AND WILDLIFE

PRESIDENT: GEORGE W. SCHMITT, 1935 S. BUCKEYE, KOKOMO, IND. 46901

DIVISION OFFICERS SEPT. 1973-SEPT. 1974	SECRETARY DENNIS WINTERS 1230 W. WASHINGTON FORT WAYNE, IN. 46804	TREASURER GALE S. ATWOOD 3625 LINCOLN ST. GARY, IND. 46408	W. CENTRAL & 1ST VP WILLIAM HOWARD 1067 EAST CLIFFORD BROWNSBURG, IND. 46112	WOMEN'S VP FLORENCE JACKSON 912 LILLIAM STREET HOBART, IND. 46342
NORTHWEST VP JOHN KOPIL 4834 PENNSYLVANIA GARY, IND. 46409	NORTHEAST VP ARTHUR FISHBACK 260 MANCHESTER AVE WABASH, IND. 46992	E. CENTRAL VP JACK WATSON 19 SOUTHDOWNS DR. KOKOMO, IND. 46901	SOUTHEAST VP RICHARD CHEEVER R. R. 2 COLUMBUS, IND. 47201	SOUTHWEST VP JOHN HORNUNG R. R. 3, BOX 233 MARTINSVILLE, IND. 46151

EXECUTIVE SECRETARY: THOMAS E. DUSTIN, 1802 CHAPMAN ROAD, HUNTERTOWN, IND. 46748 · PHONE 219-637-6264

Subject: Draft Environmental Statement,
Phosphate Leasing on the Osceola
National Forest, Florida
(dated December 1, 1973)

which will be either destroyed outright or impaired over an extended period of time. The proposal also appears to violate the principles of the Multiple Use and Sustained Yield Act, since no showing has been made that phosphate mining is an acceptable element in the best combination of uses for the Forest. Phosphate mining is clearly a single use, affecting directly nearly a fifth of the entire Forest, and indirectly affecting a far larger area of the Forest.

Discussion of alternatives in the DES is not even superficial. There are no data equating the tonnages of matrix required for the various uses, these being only broadly identified as "fertilizer" and "industrial". Therefore, ~~there~~ can be no consideration as to the unessential areas of consumption that could be eliminated or minimized in order to determine the need for phosphates from the Osceola. We estimate that detergent cleaning agents require somewhere between 5% and 20% of the phosphate matrix mined; it could be more or less, and these allocations should be spelled out in detail, along with other uses of phosphate. The potential for phosphate recovery from such bodies of water as the Great Lakes--particularly Erie, Huron and lower Lake Michigan is not discussed.

The rapid depletion of phosphate resources, indicated as becoming serious for domestic purposes before the year 2050, and already diminishing for export purposes, should have produced in the DES a comprehensive discussion of priority uses.

While the DES indicates that one-third of the phosphates mined will be in the slimes, and that these slimes will be deposited on private land, it fails to project the effects on the public interest or the environment of such deposition. The DES acknowledges the slime problems--poor bearing qualities, difficulty of restoring storage area to useful purposes, etc.; but generally fails to recognize that even if deposited on private land, the slimes will have an adverse effect, and cannot be ignored as an integral component of the mine leases. For example, it can probably be assumed that the private lands on which slimes will be deposited from the Osceola are in many cases used for other productive and renewable purposes--grazing, citrus, etc. Thus mining from the Osceola National Forest will have an effect on this present productivity, a factor not considered in the DES.

The brief period of examination of the DES has not enabled us to discover a comparative economic analysis of the present value of renewable and social resources as against the value of the mined matrix which will preclude the delivery of these other commodities and services. Perhaps this comparison can be inferred, but time limitations prevent this comparison from being brought into sharp focus. This should be clearly quantified.

Beyond these considerations, the DES identifies a number of threatened wildlife species whose habitats will be either totally or effectively destroyed by the proposed mining. The DES states that the Forest Service is charged with the responsibility of "protecting existing habitat" for these species under the Endangered Species Conservation Act of 1969. The proposed mining of this habitat is patently contradictory to this responsibility, even within the latitude suggested in the phrase "insofar as is practicable

and consistent with the primary purposes of such bureaus..." The primary purposes, after all, are defined in the Weeks Act and the Multiple Use Act--neither of which could be stretched by any definition as encompassing the scope of the proposed mining. Thus, the mining proposal seems clearly exterior to the intent of most of the legislation under which the Osceola was acquired and is managed. There would appear to be a considerable exposure for the decision-making agencies if mining is approved.

Our objections are also based on the lack of quantification and generalities of the following language in Section III, Environmental Impact of the Proposed Action, under "Ecological Relationships":

"...It is assumed the impacts on one part of the ecosystem will affect the whole...Removal of the producing components of the ecosystem would cause interruption of the food chain and loss of cover for many members of the biotic community. This could result in temporary, long term or permanent disruption of the Forest ecosystem...the severity of the short term impact is not always localized to the directly affected area, but is dependent on the ability of adjacent areas to absorb secondary impacts...the long term impacts of the development, harvest, and transportation practices that destroy vegetation and/or cause extensive surface disturbance can be particularly severe."

and under "Geology":

"...Slimes are stored in a manner higher than the original land surface. Since the slime contains uranium, its storage at or above land surface would increase radioactivity at the surface."

and under "Soils":

"...In surface mining, the natural soil horizons would be destroyed...Drag lines displace the earth in such a manner that the organic matter and most of the soil nutrients in the surface layers would be buried and lost to plant growth and subjected to leaching into the ground water. This would increase the nutrient content of ground water and would affect the receiving streams..."

and under "Erosion and Sedimentation"

"...(the mining operations would) create a potential for increased sheet erosion and sedimentation. The primary erosion hazard would exist on the periphery of the disturbed area where drainage could escape dikes, ditches and sediment basins...An estimated 55 tons per acre per year from 30 acres for a total of 1,650 tons, of sediment could enter streams in the area each year..."

and under "Flooding and Sedimentation":

"...A portion of the mineable area, on and off the Forest, is within the one hundred year flood-prone area of the Suwannee River (creating) spillage

of sediment and slime pond materials into the flood waters, thereby polluting the Suwannee River..."

and under "Fertilizer Manufacture":

"...Airborne sulphur compounds particles falling upon the soil could make the soil more acid and increase sulphur content of the soil..."

and under "After Mining":

"...Because of the drastic changes to the soil and land, precise fertility levels and productivity potentials of the overburden cannot be determined until it is shaped and then analyzed..."

and under "Watersheds":

"...Approximately 34 percent of the total National Forest watershed area tributary to the Suwannee River eventually would be mined...The mining operations would bisect several streams resulting in altered drainage characteristics. Approximately 31.5 miles of streams on National Forest land would be bisected, causing interruptions and diversions of the normal orderly stream flow. Similar impacts would occur on streams on private land..." with obvious far-ranging effects on other lands and rights.

and under "Hydrology":

"...During the mining operation, it is assumed that 750-1000 acres would be denuded of vegetation at all times..." an extremely conservative guess, considering the acknowledged difficulty (5 to 20 years) of stimulating any growth on slime spoil areas and in sand fine disposal areas, whether on private or public lands. "New and unstable outflow channels would occur as a result of mining and would increase erosion and siltation."

and under "Water Quality and Water Usage":

"...Eutrophication would occur in slow moving water bodies. Decreased levels of dissolved oxygen, higher temperatures, and greater biochemical oxygen demand levels would occur...Slime pit dams in conjunction with ore processing pose a threat of pollution, sedimentation, and flooding downstream should a break occur...The probability of a break occurring is difficult to predict. However, on March 11, 1967, an earthen dike near the Peace River in central Florida burst, releasing between 1000 and 1500 acre-feet of 'slime' into the river. Nearly all aquatic life in a 76-mile stretch to the river's mouth succumbed..."

and under "Ground Water Hydrology":

"...Pits as large as 400 feet wide, one mile long, and 30-40 feet deep would be constructed for mining operations. This could create major impacts of long term duration..."

and under "Vegetation":

"...Of particular concern is the loss of the swamp community plants in the hardwood bays and hammocks and hardwood stringers along creeks. The loss is due to the complete removal of the overburden with the accompanying disruption of all plantlife growing there...Nutrient cycles and energy flows linked with the vegetation food chain are very important to the wildlife habitat that exists in these areas. This chain would be interrupted and result in an adverse effect on wildlife and its habitat...With increasing and continuing land development in Florida and the resultant loss of area exhibiting natural plant communities, the Osceola National Forest becomes more important as a Forest environment. This loss of a Forest environment would be significant when considering the need for natural green belt areas in Florida, particularly for the Jacksonville and surrounding urban populations."

and under "Wildlife and Fisheries":

"...A common statement among persons unfamiliar with wild animal population is '...the destruction of wildlife habitat will result in a movement of animal populations into surrounding areas not directly affected by the given project.' This is an inaccurate assumption. Surface mining operations would cause wildlife movement to similar habitats (if they are available) which may already be saturated with similar species. In this case, ingress of wildlife populations to these similar habitat areas would result in over populations and a net loss of that portion of the wildlife resource that is relocated...At least two-thirds of the (black) bear population on the Osceola National Forest is in the proposed lease area...It, like the panther, requires a large home range with minimal human disturbance...The permit area comprises about one-third of the total National Forest, and supports about one-fourth of the deer herd...More than one-fourth of the Forest's turkey population is found within the proposed lease areas. Mining would destroy turkey habitat and eliminate turkey from the Western half of the Forest...The Forest supports huntable populations of small game such as raccoons, opossum, squirrel, fox...game birds, mammals and amphibians that would lose a large part of their habitat by the proposed, surface mining operation."

and further, concerning wildlife:

"...The Florida Panther (listed as a threatened species) would rapidly be eliminated from the western half of the Forest...The Red-Cockaded Woodpecker (also listed) would be severely affected through habitat destruction by mining...The Arctic Peregrine Falcon, Florida Sandhill Crane and Southern Bald Eagle are considered together because the impact to all would be similar... The alligator will be adversely affected by the drainage of swamps and bays... mining would practically eliminate the Indigo Snake and Florida Waesel from the area...The impact on the Wood Ibis and Peregrine Falcon would be similar to that of the eagle and crane..."

and under "Fisheries":

"...The value of the Suwannee River as a fishery resource would be adversely affected...The fisheries resources in the streams on the west side of the Forest might be impacted by mining activities which create increased runoff, siltation, turbidity, etc. Water temperatures would increase due to loss of protective vegetation..."

and under "Recreation":

"...Phosphate mining would affect many of the resources that contribute to the quality of recreation currently available in the proposed mining area: Water, soil, recreation supporting consumptive and non-consumptive uses of wildlife and the aesthetic qualities of these resources that provide a serene environment for hiking, fishing, camping, swimming and picnicking... An active phosphate operation would create noise, dust and transportation problems...litter along road sides, vandalism and general sanitation problems. Areas that could be expected to be disturbed include Cowhouse Bay, Deep Creek Drainage, Otter Bay, Robinson Creek, and Falling Creek. Archeological and historical areas known to exist in the western half of the Forest also would be seriously impacted. Much of the western section of the Osceola Trail would be destroyed, as would parts of Big Gum Swamp and Impassable Bay..."

These are among the acknowledged impacts of the proposed mining leases if they are granted.

It is maintained by us that these qualitative damages are totally unaccompanied by any quantitative analysis or comparison of total benefits vs total costs which would be produced by lease granting, including social loss value.

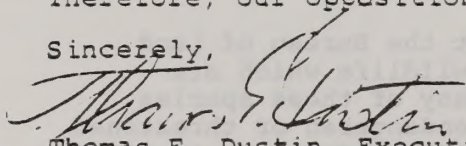
It is maintained that the proposal is inconsistent with the primary purposes of the Forest.

It is further maintained that alternatives, including reducing phosphate consumption are scarcely addressed at all in the DES.

It is additionally maintained that no showing whatever has been made for immediate need of phosphates from the Osceola, nor has any priority list been presented for essential phosphate uses.

Therefore, our opposition to lease granting is reiterated.

Sincerely,


Thomas E. Dustin, Executive Secretary
Indiana Division, Izaak Walton League of America, Inc.

c: National Offices, IWLA; Secretary of the Interior; others



National Wildlife Federation

1412 16TH ST., N.W., WASHINGTON, D.C. 20036

Phone: 202-483-1550

January 25, 1974

Lowell J. Udy, Director
Eastern States Office
Bureau of Land Management
7981 Eastern Avenue
Silver Spring, Maryland 20910

Dear Mr. Udy:

I should like to make a brief comment relating to the draft environmental impact statement on proposed phosphate leasing on the Osceola National Forest in Florida.

We are pleased that your office has scheduled hearings in several locations to obtain public reactions to this overall proposal. We believe that this is the proper method whereby the public who is most concerned about public resources can make an appropriate type of input into this type of policy.

The National Wildlife Federation joins its affiliate, the Florida Wildlife Federation, in opposing the proposed phosphate leasing in the Osceola National Forest. We adhere to the principle that insofar as possible public areas of this type should be protected from commercial enterprises and this certainly relates to the many problems which are involved with commercial phosphate mining. In substance, we feel that the recreational values of our forests should have priority over economic advantages such as mining, particularly when other opportunities for obtaining phosphate are available.

We believe that it is highly desirable that the Bureau of Land Management take into account the valuable wildlife which are located in the Osceola National Forest. Many of these species which are located in this area are either endangered or threatened with extinction and these resources must be considered in light of their overall value to man and his resources.

If phosphate mining is permitted, we strongly believe it is essential that the strongest possible stipulations are included to protect both the land surface and the nearby areas from potential air and water pollution.

National Wildlife Federation

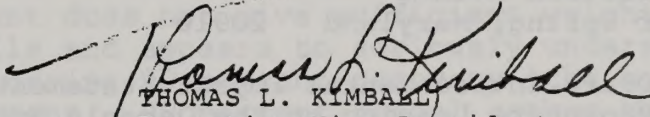
Lowell J. Udy, Director

-2-

January 25, 1974.

Thank you again for the opportunity of making these comments.

Sincerely,


THOMAS L. KIMBALL
Executive Vice President



SIERRA CLUB

FLORIDA CHAPTER Jacksonville Group

442 Gulf Life Tower
Jacksonville, Florida 32207

February 6, 1974

Director, Eastern States Office
Bureau of Land Management
7981 Eastern Avenue
Silver Spring, Maryland 20910

Re: Draft Environmental Impact Statement:
Phosphate Leasing on the Osceola National Forest, Florida

Dear Sir:

The Jacksonville Group of the Florida Chapter, Sierra Club, urges rejection of the issuance of 41 phosphate preference right leases for 52,000 acres in the Osceola National Forest, north central Florida, centered about 50 miles west of Jacksonville, Florida.

Our lengthy oral statement at the hearing has been made a part of the testimony against the proposed issuances and we do not intend to reiterate any but the following several elements here:

1. Compared to the 1.2 billion tons of phosphate reserves in North and Central Florida, the estimated 100 million tons that could be recovered in the forest over the next 30 years is unimportant and certainly pales into further insignificance when compared to the permanent loss of one-third of the forest as it exists today.
2. The forest is of great recreational value to the residents of North and Central Florida. During 1972, the latest reporting period, the forest was used over 160,000 twelve-hour periods. (See letter, dated January 23, 1974, and its attachments from Mr. B. L. Finison, Florida Forest Supervisor, Forest Service, U.S.D.A.)

In addition, the Jacksonville Area Planning Board's 1973 Comprehensive Plan for Jacksonville reports that the City is presently 5,500 acres short of recreational facilities and that this "shortfall" is projected to increase to 7,191 acres in 1990. Therefore, the forest is an extremely valuable recreational asset to a major metropolitan area



experiencing a shortage of recreational acreage and less than one hour's drive from the forest.

3. The draft Impact Statement does not give sufficient weight to possible slime pond spills and appears to seriously underestimate the water usage by considering 90 percent recovery (the highest percentage of the 80 percent - 90 percent range) rather than a probably more realistic (for the Florida climate) of 80 percent. Thus, the water usage is more likely to be 38.88 million gallons per day rather than the reported 19.44 million gallons per day. City of Jacksonville wells furnish 50 - 55 million gallons per day to municipal customers. Thus, from a water drawdown standpoint, the project might be compared to placing a city three-fourths the size of Jacksonville right in the forest.

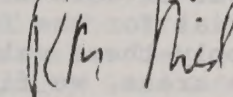
Such a draw of water from the aquifer could cause a cone of depression in the aquifer, followed by an upflow of mineralized water and the possible development of further sink holes in adjacent areas. An upflow of mineralized water could thus hasten saltwater intrusion in Lake City's water supplies and possibly Jacksonville's supplies also.

4. The natural habitat of several endangered species of wildlife, including the Florida black bear, panther and turkey, would be destroyed by the removal of almost all the hardwood in the lease area. In addition, approximately one-half of the deer population of the forest area lives in the area that would be mined.

5. Possible spillage from the slime ponds would be a hazard to the Suwannee and Santa Fe Rivers since one-third of the Suwannee's water and one-half of the Santa Fe's comes from the forest. The Suwannee has unpredictably severe flooding.

For the above reasons, as well as the additional ones we noted at the hearing, we feel that the draft Impact Statement was not sufficiently negative with regard to the proposed action. The Jacksonville Group of the Sierra Club strongly supports the denial of the subject leases.

Sincerely,



Robert M. Nied
Conservation Chairman

SOUTHEASTERN LUMBER MANUFACTURERS ASSOCIATION

1705 VIRGINIA AVENUE

COLLEGE PARK, GEORGIA 30337

P. O. BOX 87175

TELEPHONE 762-0161

February 4, 1974

Director, Eastern States Office
Bureau of Land Management
7981 Eastern Avenue
Silver Springs, Maryland 20910

Dear Sir:

The enclosed statement is to supplement the oral presentation made by the writer before the hearing on Monday, January 21, 1974 regarding the Draft Environmental Impact Statement for phosphate leasing on the Osceola National Forest in Florida.

This organization is comprised of approximately 220 lumber manufacturing plants located in Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, and Mississippi. Many of our members derive a large percentage of their annual timber requirements from the national forests located in proximity to their plants. Members of this organization do, at the present time, harvest timber from the Osceola National Forest.

The Draft Impact Statement seems to be very well written and thorough in its application, and we note with particular interest Section 2, page 84 and 85 concerning timber. We also note in the Draft that the emphasis on timber management is expected to increase in this area, and at the present time this source of income and employment is absolutely necessary to this area.

There is, however, one point with particular significance that is omitted in the Draft Impact Statement and that is the value placed on timber grown on the Osceola National Forest. During the period of July through November 1973, the Osceola National Forest enjoyed an extremely high return on timber offered for sale from these acres. This return, probably one of the highest in the nation (at least, in the Southeast), was at the rate of \$192 per thousand board feet for standing sawtimber and approximately \$36 per hundred cubic feet of pulpwood.

This bidding record not only indicates the quality of the timber present on this site but the necessity for this source of raw material for the forest products industry in this area. When we apply these values to the inventory found on the proposed lease areas, we find that the valuation of the timber-let alone the soil and other considerations-is \$22,208,440 with an annual growth potential of approximately 9,110,000 board feet. The

Director, Eastern States Office
Bureau of Land Management
Silver Springs, Maryland 20910
Page-Two-

area to be leased is increasing in value on an annual basis of \$1,750,000 per year.

In considering the impact of this mining operation on the environment, you should consider the soil - not only from the standpoint of mining but also as a basis for the environment to be considered. We realize that the entire soil profile will be completely altered by this mining operation and we are unable to determine from any past experiences, experiments or records of such experiments, the result of this alteration of the soil profile. We understand that the topsoil is a variable layer and the effect of its alteration also is not covered in any experiments or documentations. We must ask what the result of this altered profile would have on resulting vegetation, water percolation, aeration, and the other factors that will affect the environment.

As timber is the most dominant physical characteristic of the environment which will be altered by the proposed mining, we have to know prior to approving this alteration of profile the exact effects that the alteration at this site would have on its future productivity before this mining should be approved. It must be considered a complete fallacy to propose a short-term usage of this land for unknown effects as opposed to a continued usage of this land with a known effect, results and income.

It is pointed out in the Environmental Impact Statement that in all probability the water table and water factors in the area would be greatly affected by the application of one plant but it has been stated that it would be necessary for two plants in this area. We must conclude that would double the effect on the water table of this area. The exact effect of these mining operations and the manufacture of phosphate cannot be compared with the water table characteristics of other areas of Florida due to the soil characteristics, drainage, vegetative cover, rainfall, etc. of this site as opposed to others; both from the standpoint of soil and water table.

The third major area that will be altered by this mining will be wildlife. It is well documented in the Environment Impact Statement that numerous species of wildlife will be totally excluded from the approximate 54,000 acres of mining operation. The value of wildlife is personal to the people who are involved with wildlife found on this location. It must also be considered there is a source of income to the community derived from hunting activity and fishing activity on this property. To

Director, Eastern States Office
Bureau of Land Management
Silver Springs, Maryland 20910
Page-Three-

destroy the habitat of these species should not be considered. Any operation in this lease area must guarantee that the habitat and species mixture presently found on the area must be maintained. This would be impossible if any mining was conducted.

There seems to be no way to prevent streamflow and drainage patterns from being altered. With the idea of replacing slime and tailings from the manufacture of phosphate back into the areas mined, there is nothing to keep, during a flash flood or heavy rainstorms, these areas from overflowing into these drainages.

This mining would drastically affect the wildlife, both aquatic and animal, as found both in the area to be mined and in the streamflow from this area. This impact cannot be measured in dollars and cents.

In summary, taking the figures found in the Draft Environmental Impact Statement, we find that the income from this area is at least \$1,150,000. When this harvest is compared to the growth each year on these same acres, we see that there is a net retention of \$600,000 in growth not harvested. When this growth is carried at 5% interest for the thirty years to be considered, we see that the actual value of the difference between growth and cut would amount to \$2,593,200 in addition to the present value of \$22,208,440.

The writer questions the advisability of changing from this known income and known value of soil, wildlife, timber and over-all environment to a situation where the results are unknown. We learned at the Tallahassee hearing that two manufacturing plants will be necessary to process this phosphate. One of these plants will be located on the national forest and will be utilized to recover the phosphate found on this national forest. We, of course, have no reason to question this mining knowledge, but do come to the conclusion from the statement that the phosphate found on the Osceola National Forest is of sufficient value to justify this mining independent of other deposits. We respectfully request that if these leases are not terminated and denied, that any mining operations that take place on the Osceola National Forest be delayed at least 30 years.

The reason for this request for delay is that, as stated in the Environmental Impact Statement and presentation, the needs for phosphate in 30 years will be much greater than at the present. At that time, it is quite likely that evidence of reclamation of phosphate mined lands will be available, particularly on land

Director, Eastern States Office
Bureau of Land Management
Silver Springs, Maryland 20910
Page-Four-

surrounding the Osceola National Forest, to show the results of this reclamation activity. With this information, we believe that both the Secretary of Interior and Secretary of Agriculture will be able to more accurately appraise the results of mining and the reclamation of phosphate mined land.

We respectfully request that these leases be denied, or that any action toward strip-mining in the Osceola be delayed for a minimum of 30 years.

Sincerely yours,

K. G. Clemens

K. G. Clemens
Field Manager

XGC/mea

Suwannee River Citizens Association

*Working for State, County and
private conservation, management
and recreational development of
the Suwannee and tributaries*

Bell, Florida 32619
February 6, 1974



PRESIDENT

Robert W. Gould
Route 2, Box 127
Merritt Island, Florida 32952

EXECUTIVE VICE PRESIDENT

Mrs. Carl E. Shifflette
Bell, Florida 32619

VICE PRES., PUBLIC RELATIONS

Mrs. L. L. Renshaw
Route 2, Box 189-A
Titusville, Florida 32780

SECRETARY

Miss Margaret Heaps
P. O. Box 216
Fort White, Florida 32038

TREASURER

Johnny Shoemaker
Old Town, Florida 32680

Eastern States Bureau of Land Management
U. S. Department of the Interior
Silver Spring, Maryland 20907

Gentlemen:

This will follow up our informal oral presentation at the recent hearing in Lake City on mining leases in the Osceola National Forest.

One look at Figure 1 in the Impact Statement would be enough to convince any person knowledgeable of the Osceola Forest of the extent to which phosphate mining would mangle a large portion of the area, with a devastating effect upon related areas.

Surely it must not be construed that "the judgment of the Secretary is that the public interest will be served thereby."

More and more of our precious natural assets are succumbing to the inroads of commercial and industrial demands. In this case, short range financial gains for a relatively few people should not outweigh the importance of Nature's provision for her essential balance, the historical and archaeological values involved, and the emotional, aesthetic and physical well-being of vastly more people than those who would benefit by destruction of this portion of God's small paradise on earth. Such priceless areas are being gradually destroyed by insensitive interests.

The Department of the Interior is making a gross error in entertaining the idea of granting these phosphate mining leases. Only for the absolute need for food production of essential sustenance for survival of future generations--only if it should become a matter of life and death generations hence--should the ravage

of this wild and beautiful and delicately balanced work of Nature ever be considered.

Adequate facts have been presented, in which we concur. We urge the Department of the Interior to deny the granting of these leases in fulfillment of its obligation to the best interests of the public.

Sincerely yours,

Mrs. Carl E. Shifflette
Mrs. Carl E. Shifflette
Executive Vice President

DANIEL A. POOLE
President
L. R. JAHN
Vice-President

WILDLIFE MANAGEMENT INSTITUTE

Dedicated to Wildlife Restoration
709 WIRE BUILDING, 1000 VERMONT AVENUE, WASHINGTON, D. C. 20005 (202) 347-1774

IRA N. GABRIELSON
Board Chairman
HARRY L. HAMPTON, Jr.
Treasurer

February 12, 1974

Director, Eastern States Office
Bureau of Land Management
7981 Eastern Avenue
Silver Spring, Maryland 20910

Dear Sir:

This letter constitutes the Wildlife Management Institute's comments on the Draft Environment Impact Statement--Phosphate Leasing on the Osceola National Forest, Florida.

We wish to compliment the Bureau of Land Management, the U.S. Forest Service, and the U.S. Geological Survey on the quality of this report, particularly the description of the phosphate strip mining process. Quite obviously this process is highly destructive to the natural environment.

If the lease is approved, mining will continue in the forest for 30 years. After that, an additional 80-110 years will be required to bring coniferous stands back to rotation maturity after planting. Grasses, herbs, shrubs and some hardwoods may take even longer to re-invade the stripped areas, resulting in a very long time span before relative ecological stability is regained.

We believe the EIS in general underestimates the likely disruption to natural systems and overestimates mitigation measures. There simply is not adequate technology available to accomplish the mitigation anticipated, especially in the following areas:

- The Flourine Air Quality question
- Possibility of damage to the Floridian and other aquifers
- The possibility of salt water intrusion in cones of depression
- Effects on the aquifer recharge system
- The complete elimination of natural swamp systems so important to wildlife
- Damage to other, unmined, swamp systems by slurry transmission lines
- Endangered animals will be eliminated, very probably for all time
- Potential damages to water quality
- Complete loss of hardwood types important to wildlife



February 12, 1974

Loss of wildlife production from 9000 acres of wetland and forestland

Aesthetics (these cannot be mitigated for at least 80 years because much of the visual attraction is derived from mature forest stands. The report is especially deficient on this point)

The Osceola National Forest constitutes the only large segment of public land available for outdoor recreation in north-east Florida. The volume of recreation-day-use is already reaching capacity, both from the standpoint of available wildlife populations and people concentrations. Predictions in the EIS indicate carrying capacities will be reached in the near future. The total value of recreation and timber produced for the full century the mined area would be in a state of recovery, in all probability, exceeds the value of the phosphate. The report is derelict in not computing these data.

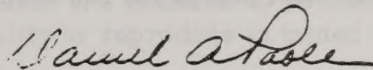
Because there are no real means of rebuilding such a natural system within a short time span, it is likely to be at least a century before wildlife populations of the kinds and numbers present today can be anticipated in the mined area. Wildlife is dependent upon food and cover, each species having specific requirements which must be met. While pines can be seeded or planted, there are no known instances where the complete ecological niche has been artificially supplied for any wildlife species. Missing components can be supplied, but not the total environment.

Phosphate mining of the Osceola National Forest undoubtedly will hasten the extinction of Florida's rare and endangered species residing there. It will completely destroy the Osceola subpopulations and their habitats.

Data presented in the report summarizing environmental damage from phosphate mining, the present values, the forest's renewable resources, human uses, and anticipated demands suggest only two of the possible alternatives are feasible. These are (1) denial of the permits to strip mine, or (2) supplant the area by purchasing replacement land having similar resources.

It is our contention that the permit should be denied. This statement has been coordinated with the Institute's Southeastern Field Representative.

Sincerely,



Daniel A. Poole

DAP:elt



February 4, 1974

Director, Eastern States Office
Bureau of Land Management
7981 Eastern Avenue
Silver Springs, Maryland 20910

Dear Sir:

Over a period of years various representatives of the Bureau of Mines, Bureau of Land Management, U. S. Forestry Service, and Department of Interior have visited the properties of Agrico Chemical Company and from their visits obtained information incorporated into the recently published transcript, "Environmental Impact Statement -- Phosphate Leasing of Osceola National Forest."

I should like in the beginning to emphasize the fact that this written statement is not for the purpose of recommending for or against the mining of the Osceola National Forest. I believe that any decision on mining the National Forest should be based on realistic fact and what in the judgement of those making the decision is in the best interest of the public.

Agrico Chemical Company, my employer, has no interest in any of the proposed mining leases on the Osceola. Our mining activities are presently limited to Central Florida. I am Director of Land Management for Agrico Chemical Company's Pierce Operations, a graduate forester, holding a Bachelor of Science in Forestry from the University of Florida and a registered forester in the State of Florida holding license #245.

Since July 1, 1965, I have been involved in the direct supervision, planning, and implementation of the land reclamation program of Agrico Chemical Company. We are not involved in research in our reclamation program and the comments I shall make in this statement are based on observations of accomplishment.

Our reclamation program is an integral part of our program of land use. Due to an economic situation (no income for 12-15 years), the planting of pines on our reclaimed properties has been limited to beautification and aesthetic values.

Director, Eastern States Office
Page 2
February 4, 1974

Growth of pines planted appears to be at least equal to that of native undisturbed land in the same area. The revegetation of our mined out lands has been aimed at positive erosion control and a resulting establishment of permanent improved pasture. We presently have on our properties, both reclaimed and reserve, a herd of cows in excess of 3,000. The use of our reserve properties has been for the past 40 years the production of pine. During this period of time Agrico planted approximately 15 million pine seedlings. We yet maintain an active forest management program and have observed no derogatory effect upon the growth of pines as a result of either our mining or chemical plant activities. As you know, all companies operating in the State of Florida are closely controlled as to emissions into the air and such other controls as are placed on the industry concerning dust, water, etc.

It is our opinion that vegetative growth on reclaimed overburden is always superior to that incurred on native land contiguous to our mining operations. Reclaimed overburden differs from most native Florida soils in that it has a much higher clay content. We have yet to determine why Ph values are usually higher or what effect the absence of a hard pan strata may exert.

Agrico has reclaimed a fine colloidal clay settling pond in excess of 400 acres. This settling area was recently sold to a Tampa dairyman primarily because of its ability to produce prolific amounts of forage for cattle. Every crop planted on this settling pond showed outstanding production. However, because of the nature of the settling pond (pure phosphatic clay), crops with a critical harvest date may or may not be harvested due to rain. Approximately four years ago we converted this pond to improved pasture and planted Argentine Bahia and White Dutch Clover.

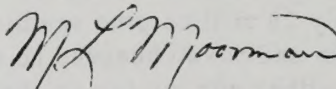
During mining, and the ultimate reclamation resulting, we generally as a rule find our reclamation projects consist of about one-half land and one-half water. Usually, within two years after mining, we observe local fishermen harvesting brim, shell cracker, bass, catfish, etc., from our mined out pits. We have not, except at our Boyette reclamation project, stocked any lakes with fish. On an experimental basis we placed 300,000 channel catfish fingerlings in a series of lakes on our Boyette property in Hillsborough County. Fishermen are now harvesting channel catfish varying in size from 1/2 pound to 13 pounds, proving to us that channel catfish exhibit the ability to reproduce in mined out phosphate pits.

To say that there are no changes incurred in the ecological community prior to, during, or after mining would be misrepresentation of fact. However,

Director, Eastern States Office
Page 3
February 4, 1974

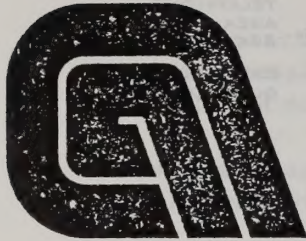
changes which occur are generally only a change from one ecological community to another. There are many expert witnesses upon whom you might call among various federal agencies who could testify concerning the reclamation program of Agrico Chemical Company and verify the validity of this statement. Should you desire a list of such persons, please advise.

Sincerely yours,

A handwritten signature in dark ink, appearing to read "M. L. Moorman". The signature is fluid and cursive, with the first letters of the first and last names being capitalized and prominent.

M. L. Moorman
Director of Land Management

MLM/cs



February 20, 1974

Eastern States Office
U. S. Bureau of Land Management
Silver Spring, Maryland

Attention: Director

Subject: Proposed Phosphate Leasing on the Osceola National Forest in Florida
EIS-FL-73-1923-D

Gentlemen:

I have noted in the subject Environmental Impact Statement that you are considering the issuance of 41 phosphate leases on the Osceola National Forest in north central Florida.

The Statement mentions that 10,000 to 14,000 acres of private land would be under slime ponds as a result of the phosphate mining.

I would like to make you aware of the fact that our company has done extensive development work and testing on the disposal of slimes from the phosphate operation in Florida and we have developed a process that is efficient, economical, and practical for dewatering the slimes. The Andco process was tested for several weeks in Florida last year and the results were quite good.

We believe that our development may markedly improve the environmental impact effects of phosphate mining by the treatment and disposal of the slime. This would make unnecessary the vast slime ponds that take up such a large and unsightly segment of the Florida landscape.

We would be happy to supply information to you or others concerning our process for dewatering slime and hope that we can be of service to you.

Very truly yours,

ANDCO ENVIRONMENTAL PROCESSES, INC.

Joseph G. Duffey, P.E.
President

JGD:klv

GLOBAL EXPLORATION & DEVELOPMENT CORPORATION

P. O. DRAWER 800
LAKELAND, FLORIDA 33801, U.S.A.



TELEPHONE
AREA CODE 813
686-1615

CABLE ADDRESS
GLOBALEDC

February 4, 1974

Department of the Interior
Bureau of Land Management
Eastern States Office
7981 Eastern Avenue
Silver Spring, Maryland 20910

Re: Osceola Environmental
Impact Statement

Gentlemen:

Pursuant to review of Draft Environmental Statement concerning Phosphate Leasing on Osceola National Forest in Florida and subsequent hearings on the matter, we are pleased in submitting our opinion, observation and constructive comments on the subject.

Prefacing our comments, this opportunity is taken in extending appreciation for courtesies and cooperation we have received from numerous people within BLM, USBM, USGS and U.S. Forest Service during our program toward development of this vital resource.

Mr. Paul D. Leonard and others involved can be commended on the effort in preparing this subject statement.

However, occurrences in the statement in certain instances do not describe conditions as they would exist in phosphate operations, while others state as fact conditions that may or may not result from phosphate activity.

Further, while the rather lengthy section on chemical plants was excellent in description, it served only to unduly accelerate concern of forestry, wildlife and environmental people, whereas a chemical plant should not and will not result within the forest in conjunction with surface extraction of phosphate minerals.

Due to practical considerations, thin matrix beds and distance from main anomaly, it would appear phosphate activity south of Interstate 10 should not occur.

Two basic approaches as to phosphate development should be taken following review of total core hole data by all companies involved.

One avenue would be a facility located within the Osceola, equi-distant from ore body periphery, capable of producing 4,000,000 TPY. Major disadvantage of this system would be excessive distances in pumping matrix and resultant tailings, as land fill, during reclamation. This distance could exceed seven miles, whereas present practice rarely exceeds five miles in matrix handling and tow to three miles in tailings disposal. Maintaining extended water re-circulation systems would present problems.

A second system could utilize two facilities, each located within the Osceola to reduce distances as outlined in the above method, with production capabilities of 2-2,500,000 TPY, each unit. This would afford reduced costs in both matrix handling and reclamation, accompanied by greater manageability of water re-cycling.

Further, in both instances, the bulk or all of slimes (-150 mesh) material would be combined with mill tailings to achieve ideal land fill. OEIS states this material would be impounded off Osceola boundaries leaving voids to include 9,000 acres of lakes. It is believed this fact caused the Forest Service and timber people to violently oppose surface extraction on minerals. Based on the slimes content on Global holdings and assuming it representative of the entire mineable area of 28,000 acres less than 5,000 acres would remain as recreational and water storage lakes with flood control features. Slash pine acreage would increase substantially since present swamp acreage exceeds the above many times. It may be possible, with additional study, to conserve major cypress stands within the mining area.

OEIS also stressed extinction of certain wild life species, some of which do not thrive in this area at present.

Summarizing, the bulk of testimony in opposition to surface extraction methods in phosphate production in the Osceola referred to chemical plant pollution, permanent aquifer damage, extinction of fish and wildlife, pollution, erroneous water consumption figures, loss of future timber production, damage to the Suwannee River and others. Proper scientific studies supported by federal, state and private interests will prove threats posed by the above concerns to be non-existent or minimal at best.

February 4, 1974

Since the Osceola phosphate deposit will be developed at some point in time, due to necessity, denial of leases to the rightfully entitled companies would tend to serve the future needs of one company presently mining within the immediate area. Contrary to public announcement, that the company holds 50 years reserves, in the vicinity outside the Osceola, actual drilling data will indicate 18 - 20 years mineable deposits at 3.4 mm TPY output. Including the 120 mm tons within the Osceola, the company would then have, in fact, 50 years reserve.

Denial of entitled leases to our company and others involved will result in severe monetary damage.

Based on present prices for phosphate rock, our companies will suffer losses of \$10.00 per ton or \$1,200,000,000.00 pre-tax profits.

This company offers the following alternate as opposed to denial of leases at this time.

Delay issuance of leases to our rightfully entitled companies for a five year period.

Utilize this period for organized, scientific investigations and studies encompassing archaeological, hydrological, reclamation, reforestation and other areas of concern regarding phosphate development, thereby reducing emotional theorizing and supposition to factual data.

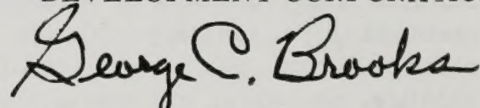
Reasonable and realistic payment to companies involved for losses sustained during this period.

Review of factual data at the end of the aforementioned five year period will provide sound basis for equitable decision rendering.

Our company is assuming a position of cooperation in this matter, however, we intend to associate with other damaged companies for protection of our rights and interests in the event a denial of leases is forthcoming.

Very truly yours,

GLOBAL EXPLORATION &
DEVELOPMENT CORPORATION



George C. Brooks,
President

GCB:bj



KERR-MCGEE CORPORATION

KERR-MCGEE BUILDING • OKLAHOMA CITY, OKLAHOMA 73102

February 5, 1974

HAROLD J. KLEEN

VICE PRESIDENT

MINERALS EXPLORATION

Director
Eastern States Office
Bureau of Land Management
7981 Eastern Avenue
Silver Spring, Maryland 20910

Re: Draft Environmental Impact Statement
Phosphate Leasing on the
Osceola National Forest, Florida

Dear Sir:

We appreciate this opportunity to comment in writing on the referenced draft Environmental Impact Statement (Statement) which you are now considering. The Statement is comprehensive in scope and important matters have been raised in it for your consideration.

The Statement recognizes that preference right phosphate leases on Osceola National Forest lands must be issued to Kerr-McGee pursuant to statutory mandate,^{1/} because of the phosphate discoveries on these lands made by it. (Statement, pp. I-1, I-6 and I-15)

1/ 30 U.S.C. §211 (a) and (b) PHOSPHATE DEPOSITS - AUTHORIZATION TO LEASE LAND; TERMS AND CONDITIONS; ACREAGE

(a) The Secretary of the Interior is authorized to lease to any applicant qualified under this chapter, through advertisement, competitive bidding, or such other methods as he may by general regulations adopt, any phosphate deposits of the United States, and lands containing such deposits, including associated and related minerals, when in his judgment the public interest will be best served thereby. The lands shall be leased under such terms and conditions as are herein specified, in units reasonably compact in form of not to exceed two thousand five hundred and sixty acres.

(Continued on following page)

Director
Eastern States Office
Bureau of Land Management
February 5, 1974
Page two

In the law suit mentioned on page I-15 of the Statement, Kerr-McGee has not only taken the same position but further shows that upon its discovery the leases must issue forthwith, there being no discretion in the Secretary to delay issuance. Nothing herein should be construed as altering that position.

Kerr-McGee's permits have had approval of the Forest Service on two prior occasions, initially in connection with issuance of permits to conduct exploration and again at the time that prospecting permits were issued to Kerr-McGee. (Statement, pp. I-13, I-14) On the later occasion the USGS issued the permits. On these occasions the Forest Service and the USGS presumably determined that the issuance of the permits and the issuance of leases in the event of discovery were consistent with the interests which those branches of the Department were and are charged with protecting.

Our comments with regard to other provisions of the draft Statement can be summarized as follows:

1. While they may be applicable to other permittees and their permit lands, many of the Statement's adverse environmental impacts from leasing do not describe the environmental impact from leasing to Kerr-McGee. The Statement should be particularized in this regard.

1/ (Continued)

Prospecting permits; issuance; term; acreage; entitlement to lease

(b) Where prospecting or exploratory work is necessary to determine the existence or workability of phosphate deposits in any unclaimed, undeveloped area, the Secretary of the Interior is authorized to issue, to any applicant qualified under this chapter, a prospecting permit which shall give the exclusive right to prospect for phosphate deposits, including associated minerals, for a period of two years, for not more than two thousand five hundred and sixty acres; and if prior to the expiration of the permit the permittee shows to the Secretary that valuable deposits of phosphate have been discovered within the area covered by his permit, the permittee shall be entitled to a lease for any or all of the land embraced in the prospecting permit. (Emphasis added.)

Director
Eastern States Office
Bureau of Land Management
February 5, 1974
Page three

2. The treatment in the Statement of the potential for reclamation does not accurately disclose the current state of technology.
3. Realistic values are not assigned to the "trade-offs" that are necessarily involved in determining whether the issuance of the leases is in the best interest of all concerned.
4. The Alternatives described in the Statement, which would deny the issuance of the leases or require that the Secretary take no action on the leases are not consonant with applicable legal and constitutional requirements.
5. To the extent that the Statement depicts environmental consequence of phosphate development on lands other than the forest lands, the Statement goes beyond the purview of the dictates of the National Environmental Policy Act.
6. Kerr-McGee is prepared to conduct its mining operations in conformity with applicable Federal and State air and water quality laws and regulations. Discussion in the Statement which assumes the contrary is inappropriate.
7. While we agree that the leases should include appropriate environmental stipulations, these stipulations should provide for prompt determinations on matters to be decided by the Authorized Officer in connection with operations on the leases and contain express provision for appeal from decisions by the Authorized Officer.

A substantial part of the problem in analyzing the environmental impact of Kerr-McGee leases arises because of the position (not endorsed by Kerr-McGee) that the National Environmental Policy Act (NEPA) requires the preparation of an Environmental Impact Statement (EIS) at the time leases issue and again at the time that a mining plan is approved for the leases. It must be clear to all that, until the mining plan is considered, an EIS

Director
Eastern States Office
Bureau of Land Management
February 5, 1974
Page four

must necessarily involve a speculation of the entire spectrum of possible mining plans for the leases. (Incidentally, Kerr-McGee does not agree that a single operation to mine the phosphate deposit will be necessary (Statement, p. I-4).)

Focus on leasing to a particular lessee is further impeded by the preparation of a "comprehensive" Statement at time of leasing which does not particularize with regard to permittees. This approach does not afford an opportunity to intelligently consider the environmental impact of leasing to the particular lessee.

Illustrative of this problem are the following matters treated by the Statement. With the exception of the Robinson Creek drainage area, none of Kerr-McGee's operations will be in "Highly Sensitive" areas of the Forest so that the extensive discussion in the Statement (Statement, pp. II-101-106) of the severe consequences of lease operations in the other "Highly Sensitive" areas is completely irrelevant to Kerr-McGee. Similarly, irrelevant to Kerr-McGee is the Statement's extensive discussion concerning slime ponds.

The Statement contains no less than thirteen separate references to the undesirable environmental impact from slimes which will be generated by phosphate mining on federal lands in the Osceola Forest. These references are inaccurate as they relate to Kerr-McGee's proposed mining operations on the forest lands and do not accurately disclose the current state of phosphate reclamation technology. Phosphate mining operations by Kerr-McGee on these federal leases will not involve slime ponds or storage of colloidal clays above natural ground level.

Brewster Phosphates, a partnership between Kerr-McGee Chemical Corp. and American Cyanamid Company, operating in central Florida is currently employing a reclamation technique which returns all slimes and sand to mined-out cuts and reclaims the mined land to natural ground level, with good bearing strength as soon as the mined out area has been re-filled. The filled area is finished off with a layer of top soil on overburden, and revegetation starts at once. There are no overburden mounds or slime ponds impounded behind high dams. Since May, 1973, all of Brewster's mining operations

Director
Eastern States Office
Bureau of Land Management
February 5, 1974
Page five

have been conducted in this manner with slime ponds eliminated. There will be left about 15% of the reclaimed area as clear-water lakes; this represents the volume of phosphate rock removed from the ground.

With the technique Brewster Phosphates is using for dewatering and compressing the clay slimes with the sand tailings, all the clay and sand will be returned to the mined-out area and overburden piles knocked down. This leaves reclaimed land at essentially natural ground level, ready for replanting with pine seedlings or other ground cover. Attached is an article which appeared in the "Mining Engineering" December, 1969 which described this reclamation technique as of that date. Substantial headway has been made since that date.

Admittedly there will be some temporary undesirable environmental affects from the forest mining of phosphates. Landforms will be changed to some extent; vegetation will be disturbed; wildlife habitat will be disturbed; and timber will be cut. Such temporary affects are inevitable in any utilization of natural resources. But as already shown, their continuance and extent can be controlled through proper techniques and planning.

The importance of phosphate to food production is recognized in the Statement (Statement, p. I-22). Further discussion of this social and economic factor seems unnecessary.

The Statement also expressly recognizes the necessity for adjustments that meet social and economic needs. For example it points out (Statement, p. II-13): "During the past five years (1968-72), a total of 192,626 tons of road material, consisting of sand and clay, has been extracted from pits of the Osceola National Forest. The Baker County Road Commission used 99,430 tons; the Florida State Highway used 45,954 tons; and the Forest Service used 47,242 tons."

The Statement is concerned with the environmental impact of manufacturing operations conducted on non-federal lands. While NEPA requires the consideration in an EIS of the environmental impact of significant federal proposals for action, there is serious doubt that NEPA requires the consideration

Director
Eastern States Office
Bureau of Land Management
February 5, 1974
Page six

of environmental impact from phosphate operations on non-federal lands when such impact would occur irrespective of the proposed federal action.

For instance, there is no showing that the environmental impact of plant workers (Statement, p. III-40), deep wells (Statement, pp. III-18-20), ponds and ditches (Statement, pp. III-20), plant air quality matters (Statement, pp. I-81, III-22-25, V-4), and utilities (Statement, p. III-42) associated with adjoining manufacturing operations will be significantly different whether or not the federal leases issue. To the extent that issuance of federal leases in the Forest would add to the impact from existing non-federal manufacturing operations, it should fairly be identified as incremental impact in the context of the pre-existing conditions.

The assertion in the Statement (Statement, p. VIII-1) that one of the Alternatives available to the Secretary is to take no action with respect to the issuance of preference right leases, is contrary to the statutory mandate that the leases issue to a prospectee upon discovery and is inconsistent with the earlier assertion that discovery by the permittee has been certified by the USGS (Statement, p. I-15).

For the same reason the assertion in the Statement (Statement, p. VIII-4) that one of the available alternatives is to deny the issuance of the leases is completely unsupported. Even the adoption of new legislation, denying issuance of the leases after discovery, would constitute an unconstitutional deprivation of vested property interests.

Kerr-McGee will, in its lease operations, comply with applicable Federal and State air and water quality laws and regulations. Those parts of the Statement which treat the control of dust, effluent discharges and emissions describe undesirable environmental impact if during mining and manufacturing control is inconsistent with these laws and regulations. (Statement, pp. III-22-24, V-8, VI-4) This would be contrary to Kerr-McGee's policy and record of compliance with the governing laws and regulations. Any such assumptions on the part of the Statement are wholly unwarranted as inferring that Kerr-McGee will violate the law if the leases are

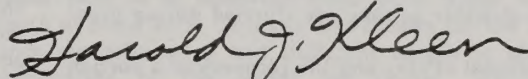
Director
Eastern States Office
Bureau of Land Management
February 5, 1974
Page seven

issued. Our record of operation on federal leases in many areas of our nation demonstrate that any such inference is completely contrary to fact.

Finally, we request that there be added as a part of the environmental stipulations for the leases contained in the Statement the following provisions:

1. A decision on any application by lessee under this lease shall be made by the Authorized Officer within 60 days following his receipt of a request therefor.
2. Orders and decisions by the Authorized Officer issued under this lease shall be subject to appeal as provided in 30 CFR, Chapter II, Part 290.

Yours very truly,



Harold J. Kleen

ih

Attach.

Building Land With Phosphate Wastes

...will extend the possibility of land reclamation at a minimal cost.

RICHARD C. TIMBERLAKE

The disposal of phosphatic clays has presented a problem to the phosphate industry since the mining of phosphate rock first began in Polk County. As the flotation process was introduced in the late 1920's the problem of clay disposal was increased significantly since clay is present in proportionally greater quantities in reserves yielding flotation concentrates. Because of their physical character and the tremendous surface area per unit volume, these clays have the characteristic of retaining large volumes of water as they are slurried during processing.

The disposal of clay and the recovery of a portion of the water require settling areas with a capacity ranging up to 2 cu ft for each cubic foot of phosphate matrix mined. According to a recent study by the Bureau of Mines, the average cost for disposal of these wastes is 24.5¢ per ton of product. This is a major cost of phosphate rock production.

Many years after the clear water is drawn off and a settling area is abandoned, the clays a few inches below the surface have reached a density of only 25-30% solids. Thus, as far as can be foreseen, today's settling areas will never be usable for anything other than limited agriculture.

This paper describes a method of disposing of waste clays in such a manner as to build usable land. This method is presently being used at Cyanamid's Chicora Mine to dispose of approximately 50% of the clays leaving the plant. We foresee eventual development to the point where we will be disposing of nearly 100% of the clays in this manner.

Traditionally, clay has been referred to as slimes. On the average, it constitutes one-third of the matrix mined in the central Florida Phosphate field and is separable from the sand and phosphate by

violent agitation with water, by hydrocyclones or hydroseparators and by decantation.

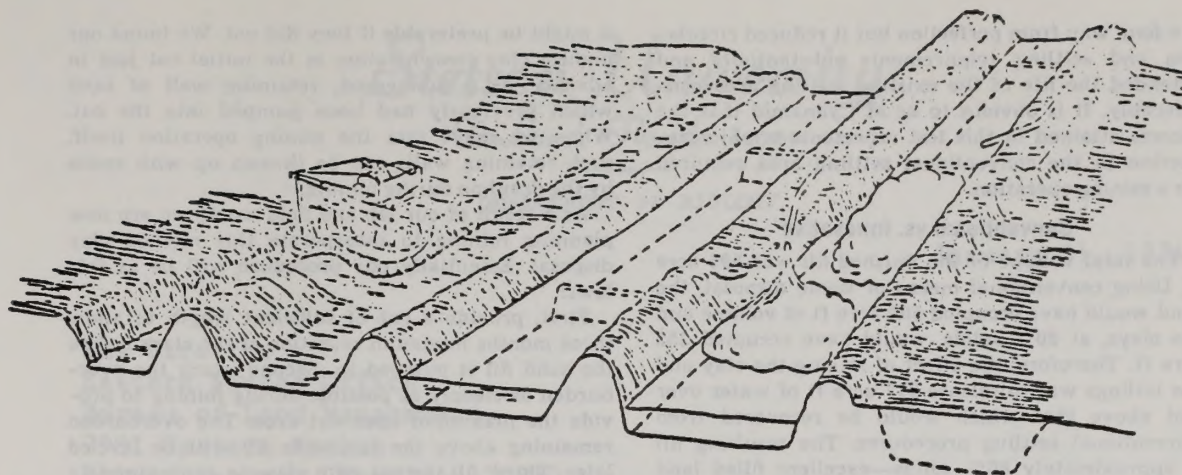
Conventional circulation and settling systems serve two purposes. They provide a means of sorting a useless waste material. They also play a key role in the increasingly important water conservation efforts of the phosphate industry. Indeed, without the vast quantities of water recovered and made available for re-use by the circulation and settling systems it would be difficult, if not impossible, for the Florida phosphate industry to operate today. However, the method of clay disposal to be described results not only in the building of usable land but also in the recovery of substantial additional amounts of water.

Despite the advantages, such systems also pose some serious drawbacks. Most dramatic is the possibility of failure of the earthen dams containing them. Occasionally one of these dams does fail, inundating the countryside and the rivers with vast quantities of water and clay. The result is severe temporary damage to the area affected and increasingly great expense to the operating company.

Construction and operation of a settling area is a major cost in the production of phosphate rock. Any reduction in settling areas, therefore, offers a possibility of substantial savings in operating costs. It has been demonstrated that eventually abandoned settling areas may be used as pasture, very good pasture. However, there is little possibility that such areas can ever be used successfully, even for light construction, and only with great difficulty for intensive, row-crop farming. These considerations stimulated us to make an intensive attack of the problems of clay disposal.

Under the direction of mines manager Erwin M. Haynsworth, the study concentrated on disposal methods at the Chicora Mine. The study team developed as its goal the mixing of mine wastes, that is the clay, tailings and overburden, in some manner that would result in usable land. It was calculated

R. TIMBERLAKE is Plant Manager, Brewster Plant, American Cyanamid Co., Bradley, Fla.



Engineer's drawing shows phosphate mining-land reclamation program developed by American Cyanamid Co., utilizing mining wastes. Dragline, at left, has created a series of cuts where phosphate matrix has been removed. Waste clays are pumped into cuts, and allowed to settle under water, with clear water recovered for re-use. Then sand tailings, right, are pumped atop the clays, mixing to some extent. Additional water is then forced from clays and re-used.

that a mixture of the clay, sand and overburden could actually be put back into the mined-out pits, thereby minimizing dam construction, and at the same time restoring usable land.

From the discussions came several proposals. Among them were: (1) Thicken clays to 10-20% solids in the plant thickener. Use the thickened clays to re-pulp the plant de-watered tails. Use the mixture to build land in the mined-out cuts. (2) Thicken the clays to 15-25% solids in the mine cuts. Pump the plant tails to the cuts and spray a de-watered coating of tails on the thickened clays. (3) Pump thickened clays from the present impoundment areas, mix with plant tailings, and use the mix to fill the mine cuts. All proposals suggested mixing two plant waste materials, that is, sand which has good bearing strength, and clay, which has a very low bearing strength.

Based on laboratory results, it was decided to run a plant-scale test of the first proposal. That, you will recall, was to attempt to thicken slimes to 10-20% solids in the plant thickener. These thickened slimes would be used to re-pulp dewatered tailings, and the resulting mixture used to build land in mined-out cuts. Since start-up at Chicora we have been de-watering tailings at the plant and returning the treated water immediately to the flotation section. The tailings have then been re-pulped with return water from the circulation system and pumped to disposal sites. The thickener at Chicora has a bowl 550 ft in diam. By making major flow distribution changes in the plant we were able to route primary hydrocyclone slimes directly to the thickener. We quickly discovered that we could not reach the desired 10-20% solids with a single plant thickener. In fact, the very best density we have been able to achieve has been 5%. The idea of installing several 550-ft thickeners in series was studied and was abandoned as being totally unacceptable from an economic standpoint. Therefore, the test program was modified.

Early mine planning at Chicora involved the relocation of a stretch of the South Prong of the Alafia River. Therefore, before mining began, a new channel for the river was dug. This channel was 8400-ft long with an average depth of 38 ft and an average width of 136 ft. Our plans were later changed, however, and we began to fill the cut with plant tailings.

When we were ready to begin the land building tests, 3400 ft of the cut had been filled, leaving about 5000 ft of open-cut filled with water to a depth of some 35 ft. This cut was chosen for the test since we believed it had sufficient length to allow clarification of the water for re-use. We implemented the new program by re-pulping the de-watered plant tailings with thickener underflow. This underflow averaged 3.5% solids, the best density we could sustain. The mixture then was pumped through a 16-in. pipeline to the cut. This pipeline from the plant alternately fed two, 16-in. lines, discharging along opposite sides of the cut. The sand-clay mixture was pumped into the cut until it reached ground level. In the meantime the discharge line on the opposite side was being moved ahead 100 ft. Pumping was then switched to the other side while the first line was extended.

As was expected, the inflowing sand-clay mixture tended to dissociate; the sand settling rapidly while the clays migrated and settled slowly. However, as the clay settled the incoming sand tended to flow over and mix with the thickened clay. The gentle motion of the sand encroaching on the thickened clays liberated large volumes of water, eventually creating masses of settled clay which approached 35% average density. As the sand was added to this clay the final mixture attained a density of 70-80% solids.

While the total test disposed of only 22% of the minus 150 mesh material produced by plant operations, in the latter stages we were containing, and mixing, up to 45% of the total clays produced. This

is a long way from perfection but it reduced circulation and settling requirements substantially and extended the life of the existing settling area considerably. It is obvious to us at Cyanamid that the success attained in this test represents a major reduction in the conventional settling area required for a mining operation.

Conventional vs. Innovative

The total volume of the finished fill was 595 acre ft. Using conventional means of waste disposal, the sand would have occupied 560 acre ft of volume and the clays, at 20% solids, would have occupied 252 acre ft. Therefore, the effect of mixing the clay and the tailings was to release 217 acre ft of water over and above that which would be recovered from conventional settling procedures. The resulting fill is approximately 80% solids—excellent filled land compared to the 20-30% solids which is the maximum normally found in an exhausted, conventional settling area. Furthermore, this fill has good bearing strength. Within a few days after completion it was supporting D-8 tractors and other heavy equipment.

The area was fertilized with diammonium phosphate, then seeded with a mixture of Bermuda and Bahia grass. Germination and growth proved rapid. An adjacent tailings plot showed almost no response to similar treatment.

In summary, what we have accomplished with this first plant scale test is the disposal of up to one-half of the clays produced by plant operations, in such a manner as to compact them to 14% of the volume they would normally occupy, increasing water recovery, substantially extending the life of our existing conventional settling areas, and creating usable land.

This test led to the second plant scale test, still in progress. Clays are being transported through an existing settling area to an old, water-filled, hydraulically-mined pit. Here the clays are being allowed to settle for a minimum of three months under the surface of the water. This three months delay has allowed them to thicken to the 15-25% solids usually found in a conventional settling area. After the settling period, tailings, de-watered at the plant and re-pulped with thickener underflow, are being pumped into the settled clays. In this test as in the prior ones, of course, the clarified water is being returned to the system for reuse.

Working Model Sets Rules

We now have sufficient information to indicate that we will reduce the circulation and settling ratio at Chicora Mine by one-third. This will reduce circulation and settling costs by one-third. At the same time, it will increase water recovery and extend land reclamation by greatly reducing the conventional settling system. We also reduce the hazard to ourselves and our neighbors posed by the possibility of dam failure.

After initial settling is complete, the key to forcing the clays to give up more of the trapped water is to promote a rolling and squeezing action by the addition of sand. Properly applied, the sand will do this. The thickened clays need not migrate; in fact,

it might be preferable if they did not. We found our highest clay concentration in the initial cut just in advance of a submerged, retaining wall of sand which previously had been pumped into the cut. When we move into the mining operation itself, such retaining walls can be thrown up with spoils by the dragline during mining.

As a result of our lab and field work, we are now planning mining to incorporate this method clay disposal. Essentially our procedure will be as follows:

First, provide a cut of sufficient length to allow three months minimum retention of the clays before the sand fill is pumped in. Second, stack the overburden as steeply as possible during mining to provide the maximum open cut area. The overburden remaining above the hydraulic fill will be leveled later. Third, fill the cut with clays to approximately the original land contour and allow to settle for a minimum of three months. During this period, maintain a high liquid level to prevent crust formation due to evaporation. Fourth, after the settling period, pump in de-watered plant tailings, sand re-pulped with thickener underflow. To a great extent the sand will mix with the clays forcing out substantial quantities of water in addition to that already recovered in the initial settling period. Fifth, grade the overburden back across the tails and the land is ready to be seeded.

The Ultimate Goal

We realize that we do not yet have all the answers. The ultimate goal is to convert all plant wastes into usable land. However, the rest of the answers will come with further study and operating experience. Right now, we are in a position to substantially reduce waste disposal costs. We can also reduce the number of miles of dams required for conventional circulation and settling systems, with their costs of construction and maintenance and the hazard they pose in operation. However, this procedure does not completely eliminate settling areas. Certainly some of the savings will be offset by additional pumping costs, but the savings in land reclamation will be substantial. Any company can implement a similar procedure.

Many of the companies may already have everything necessary to get started. In our own case, our mining plans since 1960 have been based on expediting land reclamation rather than on waste disposal. Therefore, we must change our mining plans. We are now doing this.

The ultimate goal is to mix the clays completely with the sand. Clay particles, due to their small size can be contained in the voids between the sand particles. This is the way it was before we dug it out of the ground, and someday, somehow, we will learn how to put it back that way.

Today, we have half a loaf. We recognize it. But this half a loaf today will cut waste disposal costs, reduce the dams built, increase water recovery, and extend the possibility of land reclamation at a minimal cost. We plan to continue seeking the full loaf, but we are also going to make the fullest use of what we have.

ME

Stetson University

DeLand, Florida 32720

DEPARTMENT OF BIOLOGY

January 21, 1974

The Director
Eastern States Office
Bureau of Land Management
7981 Eastern Avenue
Silver Springs, Maryland 20910

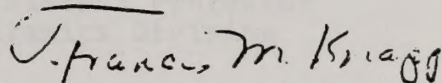
Dear Sir:

It is requested that the following statement regarding phosphate leasing in the Osceola National Forest be made part of the permanent written testimony.

The issuance of phosphate mining permits in the Osceola National Forest and immediately adjacent lands is contrary to the best interests of the citizens of Florida and the United States. The threat to the forest, the watershed as well as persons of the area is of prime consideration. To develop pitted regions of the magnitude anticipated with the resulting removal of top soil and associated flora in an environmental fragile area will insure a scarred condition in the forest for many years with total recovery doubtful. In addition, the probable contamination of both underground and surface waters will be deleterious to available water supplies including those adjacent streams--particularly the Suwanee River which is uniquely significant.

At present there is no immediate need for tapping the phosphate beds of Osceola Forest. This constitutes a commercial venture directed at a readily accessible inexpensive mineral source. Until such time as sources elsewhere are expended those lands set aside for the welfare of the citizens should not be developed.

Sincerely yours,



Francis M. Knapp, Ph.D.
Chairman

FMK:na

Stetson University

DeLand, Florida 32720

DEPARTMENT OF BIOLOGY

January 21, 1974

The Director,
Eastern States Office
Bureau of Land Management
7981 Eastern Avenue
Silver Springs, Maryland 20910

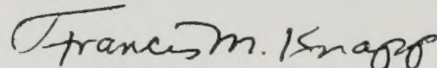
Dear Sir

The Environmental Council of Volusia Council (Florida) has directed me to address this letter to you regarding phosphate leasing in the Osceola National Forest. It is requested that the following be made part of the permanent testimony.

The primary thrust of those interested in mining the phosphate is to obtain a high yield for minimal cost. This can be accomplished only by activities totally destructive to the Osceola National Forest. To alter an already fragile environment and to do so in a fashion that can prevent recovery for as long as thirty years can only prove suicidal to certain aspects of the region.

To provide an adequate commentary on specific aspects of the Environmental Impact Statement necessitates far more than this letter can stipulate. Therefore, the Environmental Council herein stipulates that they are opposed to the granting of phosphate leases in Osceola National Forest under any circumstances that currently exist.

Sincerely yours,



Francis M. Knapp, Ph.D.
Corresponding Secretary
Environmental Council of
Volusia County

FMK:na



COLLEGE
OF
ENGINEERING

UNIVERSITY OF FLORIDA

GAINESVILLE, FLORIDA 32611

DEPARTMENT OF MATERIALS SCIENCE
AND ENGINEERING

February 5, 1974

Director, Eastern States Office
Bureau of Land Management
7981 Eastern Avenue
Silver Spring, Maryland 20910

Dear Sir:

Enclosed is some supplementary material concerning phosphate waste disposal research which was requested of me at the hearings in Lake City, Florida, concerning phosphate strip mining in the Osceola National Forest.

You will find:

1. Copies of research reports and proposals from the Dept. of Materials Science and Engineering at the University of Florida
2. Some references on waste disposal methods. I am sure the Bureau of Mines people are aware of the ones I have quoted. They should be consulted for a more extensive listing, particularly to the work done by the TVA.
3. A copy of a letter to Mr. Maywood Chesson, manager of the Occidental White Springs operation. The letter is self-explanatory.

If I can be of any further assistance please contact me.

Sincerely yours,

Ronald Loehman
Assistant Professor
Ceramics Division

REL:bam
Enc.

Some Selected Phosphate References

1. M. H. Stanczyk and I. L. Feld, "Chemical Processing of Florida Phosphate Rock Slime," U. S. Bur. Mines Rept. Invest. No. 6844 (1966).
2. Alexander May, "Calculated Mineral Composition of Florida Phosphate Slimes," U. S. Bur. Mines preliminary report, Tuscaloosa Laboratory, Nov. 1973.
3. J. R. Lehr, G. H. McClellan, J. P. Smith and A. W. Frazier, "Characterization of Appetites in Commercial Phosphate Rocks," Int'l. Colloquium on Solid Inorganic Phosphates, Toulouse, France, May 1967.
4. W. H. Huang, "New Stability Diagrams of Some Clay Minerals in Aqueous Solution," Nature (Phys. Sci.) 243 35 (1973).
5. H. E. Goeller, "An Optimistic Outlook for Mineral Resources," U. of Minn. Forum on Scarcity and Growth: Towards a National Materials Policy, June 22, 1972.
6. D. Thompson and F. C. Vilbrandt, "Effect of Ultrasonic Energy on Settling of Solids in Phosphate Tailing," Ind. Eng. Chem. 46, 1172 (1954).
7. E. C. Houston, V. J. Jones and R. L. Powell, "Electrical Dewatering of Phosphate Tailing," Mining Trans. 184, 365 (1949).
8. E. W. Greene and J. B. Duke, "Selective Froth Flotation of Ultrafine Minerals or Slimes," SME Transactions, 389 Dec. 1962.
9. J. E. Davenport, F. Carroll, G. W. Kieffer and S. C. Watkins, "Beneficiation of Florida Hard-Rock Phosphate," I&EC Proc. Design & Dev. 8 527 (1969).
10. Shion-Chuan Sun and F. J. Smit, "Reclamation of Phosphate From a Florida Washer Slime by Flotation," SME Transactions 454, Dec. 1963. [This report contains extensive references to the earlier literature].



COLLEGE
OF
ENGINEERING

DEPARTMENT OF MATERIALS SCIENCE
AND ENGINEERING

UNIVERSITY OF FLORIDA

GAINESVILLE, FLORIDA 326

July 26, 1973

Dr. George T. Tsao
Program Manager
Division of Advanced
Technology Applications
National Science Foundation
Washington, D. C. 20550

Dear Dr. Tsao:

This letter will serve as the first semi-annual progress report for the period January 1, 1973 to July 1, 1973 under the NSF grant "Dewatering of Phosphatic Slimes," Grant No. GI-36760X. The major accomplishments during this period are summarized in this letter.

The research work directed towards developing an effective method of dewatering of phosphate slimes is being attacked from two directions (1) Engineering Studies and (2) Fundamental Aspects.

After reviewing previous research work, it was apparent to us that a successful dewatering technique will have to be a combination of two or more low cost processes. To our knowledge this has not been tried in the past. Any successful technique will have to meet the following requirements.

1. Low energy consumption,
2. Applicability at large scale without high capital investment,
3. Low operation costs,
4. Technical feasibility.

The various processes which have been found to be successful in dewatering the phosphatic slimes on a laboratory scale include sedimentation of flocculated slimes, freezing and centrifuging. Unfortunately none of these processes satisfy all of the above mentioned requirements, e.g., in conventional sedimentation of flocculated slimes, the cost of organic flocculants is prohibitive. In freezing the energy requirements are very high and centrifuging is expected to involve very high capital investment. The possible approaches to the problem considered were: (1) sedimentation of raw slimes without any chemicals, (and/or) (2) developing a new technique which is purely mechanical. In other words, develop a process or combination of processes which take maximum advantage of natural forces, e.g., gravity.

In the slime ponds it usually takes 3 to 4 years to achieve the desired solids content of 30%. Flocculated slimes result in faster initial settling but do not give denser flocs and settle to only 20% solids content. A careful analysis indicated that "unflocculated" slimes which give dense settling could be aided in sedimentation rate by slow shearing of the settling bed. Thus, the experimental work was focused in this direction. The progress to date can be summarized as follows:

1. Slime Dewatering Unit: A slime dewatering machine was designed and constructed. Since reverse and forward motion of the rakes was automatically controlled, prolonged experimentation was possible with this unit. 1000 mls of slime samples (2.7% solids content) were used. No chemicals were added. The solids content of the samples to which slow stirring was employed for 17 days was determined to be 25% as compared to 11% for those where no stirring was employed.

2. Seepage: It was thought that if a medium for seepage or drainage of water through the settled bed is provided, along with the capillary action and evaporation, the compaction of the settled slimes would be faster. These experiments were conducted in cylindrical glass tubes. 400 mls of slime samples of 2.7% initial solids content were used. The solids content after about 22 days were determined to be 40% with a seepage medium (a cloth strip) and 8% without the seepage medium.

Flocculated slimes were also subjected to seepage experiments. No significant effect of organic flocculants on the formation of dense beds was found with the presence of seepage.

3. Seepage and Slow Shear: Seepage or drainage of water through the settled bed was found to be the main mechanism for compaction of the settled slimes. Seepage with slow shear experiments were conducted in slime dewatering machine. The initial solid content for the 1000 mls samples was 3.4%. No chemicals were added. The average solids content for a settling period of 3 days are given below,

Seepage with shear.....	21%
Seepage only.....	14%
Shear only.....	10%
Settling without seepage and shear.....	5%

Initial considerations of economic aspects indicated that seepage with slow shear can be employed on industrial scale by proper selection of seepage medium and providing slow shear by means such as with rafts dragged over the surface of the settling ponds.

4. Stage Settling: Stage settling is very important from the point of view of practicability of combining seepage with a slow shearing process on an industrial scale. Experiments were conducted in the slime dewatering unit in which it was established that stage settling is possible.

Dr. George T. Tsao
July 26, 1973
Page 3

Detailed results and conclusions of the above experiments form the basis for a paper that is now being prepared for submission to the AIME Society Journal.

5. Agglomeration: It has been suggested in the literature that imparting some kind of rolling action to the flocs might squeeze out water from the flocs thus increasing the floc density. For this purpose a Plexiglas^R cylindrical mill was designed and constructed. Gentle rolling action did result in relatively denser flocs.

At present there does not exist a method for the determination of compactness of the flocs formed, however. This information is considered very necessary in order to indicate the effectiveness of various flocculation methods. A sink-float method for measuring the density of the flocs has been developed. Further modifications of this method are presently being developed. The experimental results are to be published in the near future.

It was established on a laboratory scale that seepage or drainage from the settled bed is the main mechanism for compaction of the settled bed. Slow shear, capillary action and evaporation further enhance the seepage rate.

In order to investigate the practicability of seepage with slow shearing on a large scale, a larger wooden tank 5' x 4' x 1 1/2' has been designed. Various parameters such as shearing speed, effect of initial solids content, effect of addition of tailings sand, etc., on effectiveness of dewatering will be studied.

It is apparent from the discussion so far that to develop a successful technique for dewatering of phosphatic slimes it is very essential to understand the floc behavior especially the factors which render flocs denser. The use of small quantities of flocculating agents may be tolerable economically if the gains justify their use. To investigate these factors work was simultaneously started in this direction.

Preliminary experiments on effect of stirring speed and duration during flocculant addition showed that floc size is dependent on the amount of flocculant added and the intensity and time of stirring. The best floc for settling purposes seemed to be produced when a slight excess of flocculant was present and the stirring was continued for 30-60 seconds after addition of the flocculant.

It was felt at this stage that a good understanding of the binding energies between the various flocculants and the slimes was essential to further investigate the low density loose floc structures that result. For this purpose calorimetric studies were conducted.

Dr. George T. Tsao
July 26, 1973
Page 4

6. Calorimetric Studies: This area of research involved a study of the binding of slime particles by the flocculant. The calorimetric experiments were performed with a highly sensitive solution micro-calorimeter (LKB 10700-2 Batch Microcalorimeter, LKB Inds. Inc., Rockville, Md.).

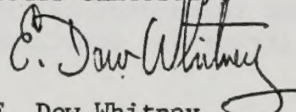
Approximately 4 mls of 4 wt % slimes and 2 mls of 0.1 wt % HF 821.2a (flocculant) were used in each experiment. Eight experiments were run but due to the high degree of complexity of the systems reproducible results have not been obtained. Most of the experiments did show an initial exothermic heat with a later, large endothermic heat ($>7\mu$ cal) which slowly returned to base-line over a time of approximately 30 minutes. The fact that both endothermic and exothermic heats are produced in the same mixing experiments, and that they have different time constants indicates that several different competing processes are occurring simultaneously. Present efforts are directed towards separating the various competing reactions so that they may be evaluated individually and their effects subtracted from the overall heat of reaction to give the enthalpy for the binding of slime and flocculant.

Work is underway to standardize the experimental procedure so that aging and dilution effects may be eliminated.

7. Electron Microscope Studies of Floc Structure: From the scanning electron micrograph of freeze dried slime sample high interconnectivity of the flocs has been observed. Further experiments are underway to determine if the freeze dried structure is indeed identical to the hydrated form. Once this is established comparisons will be made of structures produced with different materials under various experimental conditions. Hopefully, these will indicate which variables produce, low density, loose structure which resist compaction.

In conclusion we believe that the seepage/slow shear techniques may represent a break-through in the technology of slime dewatering. The technique will be pursued in much greater detail, with emphasis on scale up. The possibility of tests on small ponds at the plant of a phosphate producer is being explored so as to expand the scale up efforts. Basic research on floc behavior will also continue so as to better understand the mechanisms involved in dewatering. Several publications are being prepared for submission to the Mining Society of the American Institute of Mining, Metallurgical and Petroleum Engineers.

Yours sincerely,



E. Dow Whitney
Director, Center for
Research in Mining &
Mineral Resources



COLLEGE
OF
ENGINEERING

UNIVERSITY OF FLORIDA

GAINESVILLE, FLORIDA 326

DEPARTMENT OF MATERIALS, SCIENCE
AND ENGINEERING

October 24, 1973

Dr. Geroge T. Tsao
Program Manager
Division of Advanced Technology Applications
National Science Foundation
Washington, D. C. 20550

Re: Request for Continued Support Under Grant GI-36760X

Dear Dr. Tsao:

This letter is in response to instructions outlined in Mr. Wilbur W. Bolton's letter of December 21, 1972 addressed to Dr. Stephen C. O'Connell for continued support of Grant GI-36760X entitled, "Dewatering and Utilization of Phosphatic Slimes" for the period January 1, 1974 to December 31, 1974.

This letter is composed of two parts: (1) an informal report on work conducted during the first year of the two year NSF grant which was initiated on January 1, 1973; and (2) a proposed work statement and budget for the second year of the grant.

(1) During the present grant year research work was directed towards developing an effective method of dewatering of phosphate slimes from two directions, (a) Engineering Studies and (b) Fundamental Aspects.

After reviewing previous research work, it was apparent to us that a successful dewatering technique will have to be a combination of two or more low cost processes. To our knowledge this has not been tried in the past. Any successful technique will have to meet the following requirements.

- i. Low energy consumption,
- ii. Applicability at large scale without high capital investment,
- iii. Low operation costs, and
- iv. Technical feasibility.

The various processes which have been found to be successful in dewatering of phosphatic slimes on a laboratory scale include sedimentation of flocculated slimes, freezing and centrifuging. Unfortunately none of these processes satisfy all of the above mentioned requirements, e.g., in conventional sedimentation of flocculated slimes, the cost of

Dr. George T. Tsao
October 24, 1973
Page 2

organic flocculants is prohibitive. In freezing, the energy requirements are very high and centrifuging is expected to involve very high capital investment. The possible approaches to the problem considered were: (1) sedimentation of raw slimes without any chemicals, (and/or) (2) developing a new technique which is purely mechanical. In other words, develop a process of combination of processes which take maximum advantage of natural forces, e.g., gravity.

In the Florida phosphatic slime ponds it usually takes 3 to 4 years to achieve the desired solids content of 30%. Flocculated slimes result in faster initial settling but do not give denser flocs and settle to only about 20% solids content. A careful analysis indicated that "unflocculated" slimes which give dense settling could be aided in rate of sedimentation by slow shearing of the settling bed. Thus, the experimental work was focused in this direction.

As a result of our laboratory studies it was discovered that seepage media introduced into a settling slime markedly enhanced the rate of settling and the degree to which the settled slime could be densified. This effect is obtained on as-received slime having no chemical additives.

The seepage aid consists of a porous substance that is placed vertically in the slime. The porous substance extracts water gradually from the slime and acts as a transport medium by allowing water to pass along it and out of the system. A properly designed seepage medium shows little evidence of clogging, and in that respect is very much different from normal filtering techniques.

A wide variety of porous substances have been found to function as seepage aids. Different types of cloth, ropes, and solid porous media (including sand) function with various degrees of effectiveness.

Most of the laboratory experiments have involved bench-scale quantities of slime. The curves shown in Fig. 1 compare the settling behavior of slime under three conditions; (a) gravity settling, (b) capillary rise, and (c) seepage. The settling rate with seepage is dramatically higher than the other two cases. A 30% solids level is reached within 3 days, and a 50% solids level is reached in 9 days.

Similar results were obtained with different types of seepage aids and in different arrangements. In most cases enhancement of rate and degree of densification as compared with unaided slime settling was achieved.

A few tests were made in much larger test cells. A tank was constructed having a height of 5 ft., a width of 4 ft., and a breadth of 3 ft. Twelve seepage aids were introduced into the tank. The dewatering results shown in Figure 2 were obtained. A solids content of 30% was achieved in approximately 30 days.

Dr. George T. Tsao
October 24, 1973
Page 3

It is apparent that many experiments will be needed to evaluate a variety of seepage media materials and design concepts on a scale at least as large as the tank utilized in our initial experiment.

The most significant aspect of seepage dewatering is that it has the potential for being of sufficient low cost to be practical. Costly additives such as flocculating agents were avoided. Energy consumption for operating the dewatering process would be low, since gravity provides the basic driving force.

It is possible that a dewatering facility would involve a substantial initial capital investment. However, if the facility is permanent and requires relatively low costs for maintenance, the initial costs would be spread out over many years so that the annual costs could be within reason. A further benefit would be the elimination of new dam construction and savings of millions of dollars annually that could be applied to defray the costs of building, operating, and maintaining a seepage dewatering facility.

Further details of our work may be found in the First Semi-Annual Progress (Letter) Report on this project for the period January 1, 1973 to July 1, 1973, dated July 26, 1973.

(2) In view of (1) and the second-year work statement contained in Proposal No. P3I3046, we propose to carry out the following studies during the second grant year. (a) It has become apparent that it will be virtually impossible to conduct numerous large scale tests to evaluate seepage media materials in the laboratory because of the limited facilities for quantity and because of the large quantity of slime that would need to be transported to the University of Florida. Therefore, on-site experiments at a mining facility in central Florida is the only practical means for conducting future engineering studies. Such work is not within the scope of the current NSF project. Therefore, financial support from the Florida Phosphate Council is being sought to field test a variety of large-scale modifications based on the seepage concept. In affect, a joint program between NSF and the Florida Phosphate Council would be established, with NSF sponsoring the basic research needed to understand the fundamental principles involved in seepage dewatering and the Florida Phosphate Council supporting the field engineering aspects. The former would provide basic information needed to optimize the design of the field experiments. The two projects would be coordinated within the Center for Research in Mining and Mineral Resources at the University of Florida.

In order to accomplish these objectives a two-phase project has been proposed to the Florida Phosphate Council for on-site field evaluation of large scale dewatering operations.

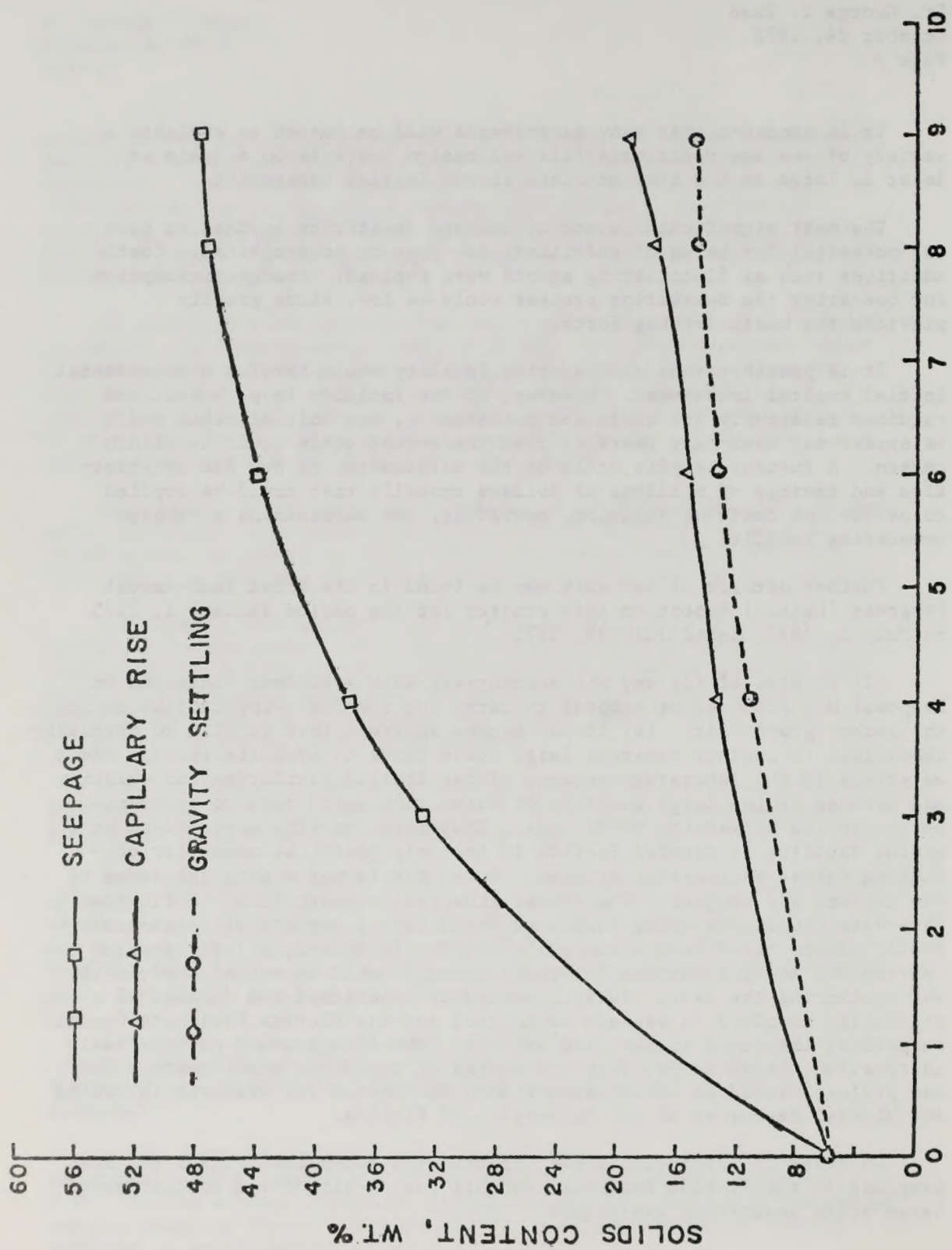


Figure 1. SETTLING TIME, DAYS

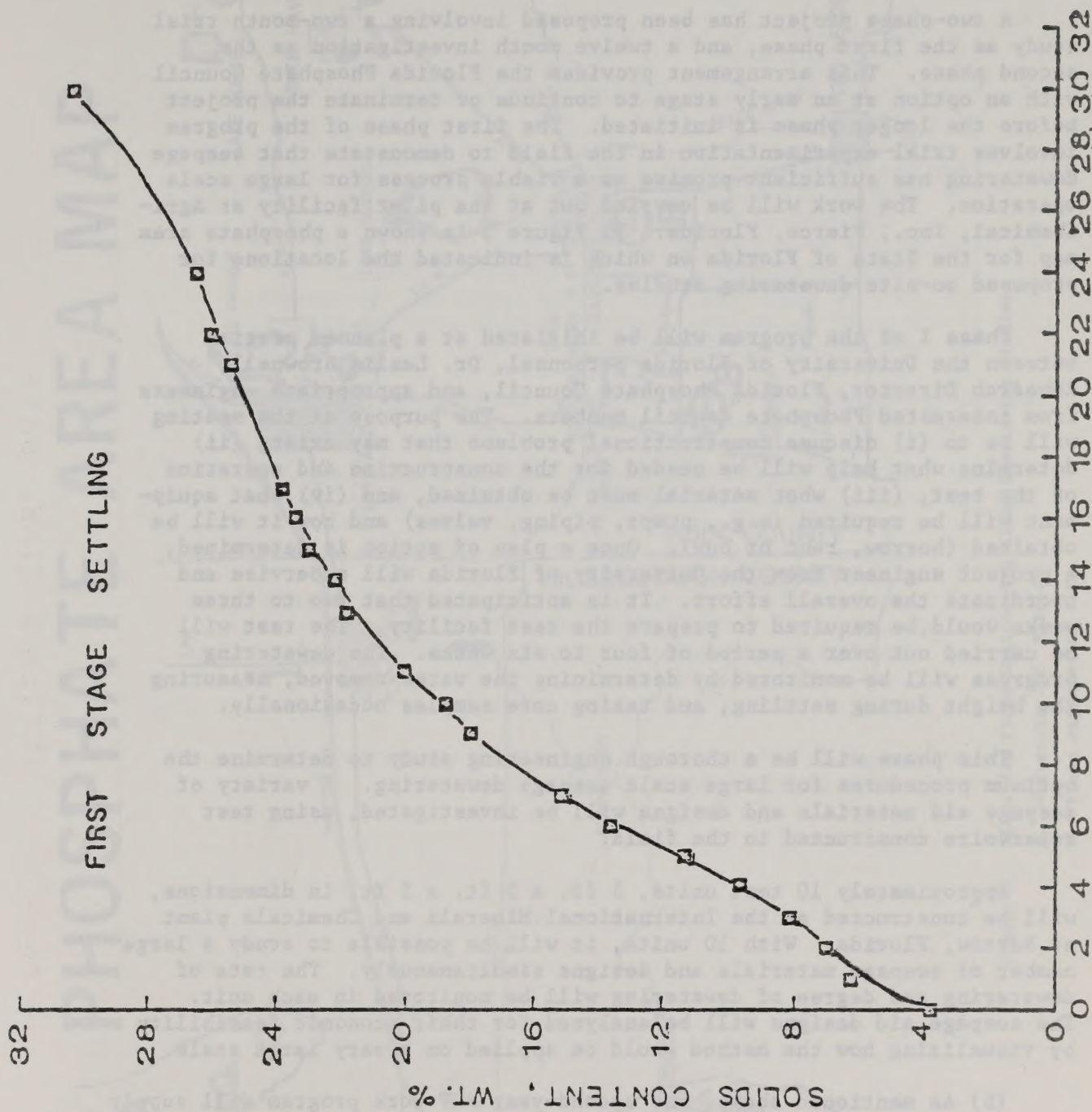


Figure 2. SETTLING TIME, DAYS

A two-phase project has been proposed involving a two-month trial study as the first phase, and a twelve month investigation as the second phase. This arrangement provides the Florida Phosphate Council with an option at an early stage to continue or terminate the project before the longer phase is initiated. The first phase of the program involves trial experimentation in the field to demonstrate that seepage dewatering has sufficient promise as a viable process for large scale operation. The work will be carried out at the pilot facility at Agri-Chemical, Inc., Pierce, Florida. In Figure 3 is shown a phosphate area map for the State of Florida on which is indicated the locations for proposed on-site dewatering studies.

Phase I of the program will be initiated at a planned meeting between the University of Florida personnel, Dr. Leslie Brownell, Research Director, Florida Phosphate Council, and appropriate engineers from interested Phosphate Council members. The purpose of the meeting will be to (i) discuss constructional problems that may exist, (ii) determine what help will be needed for the construction and operation of the test, (iii) what material must be obtained, and (iv) what equipment will be required (e.g., pumps, piping, valves) and how it will be obtained (borrow, rent or buy). Once a plan of action is determined, a project engineer from the University of Florida will supervise and coordinate the overall effort. It is anticipated that two to three weeks would be required to prepare the test facility. The test will be carried out over a period of four to six weeks. The dewatering progress will be monitored by determining the water removed, measuring the height during settling, and taking core samples occasionally.

This phase will be a thorough engineering study to determine the optimum procedures for large scale seepage dewatering. A variety of seepage aid materials and designs will be investigated, using test reservoirs constructed in the field.

Approximately 10 test units, 5 ft. x 5 ft. x 5 ft. in dimensions, will be constructed at the International Minerals and Chemicals plant at Bartow, Florida. With 10 units, it will be possible to study a large number of seepage materials and designs simultaneously. The rate of dewatering and degree of dewatering will be monitored in each unit. The seepage aid designs will be analyzed for their economic feasibility by visualizing how the method would be applied on a very large scale.

(b) As mentioned above, the second-year NSF work program will supply the basic research needed to understand the fundamental principles involved in seepage dewatering. To accomplish these aims the progress of phosphatic slime dewatering will be studied in a verticle filtration device with the goal of mximizing filtration rate. Experimental approaches to filtration optimization will include (i) systematic alteration of physical parameters of the system and analysis of the effect on filtration, and (ii) a basic understanding of the mechanistic behavior of the seepage system. Examples of specific studies to be conducted are as follows:

PHOSPHATE AREA MAP

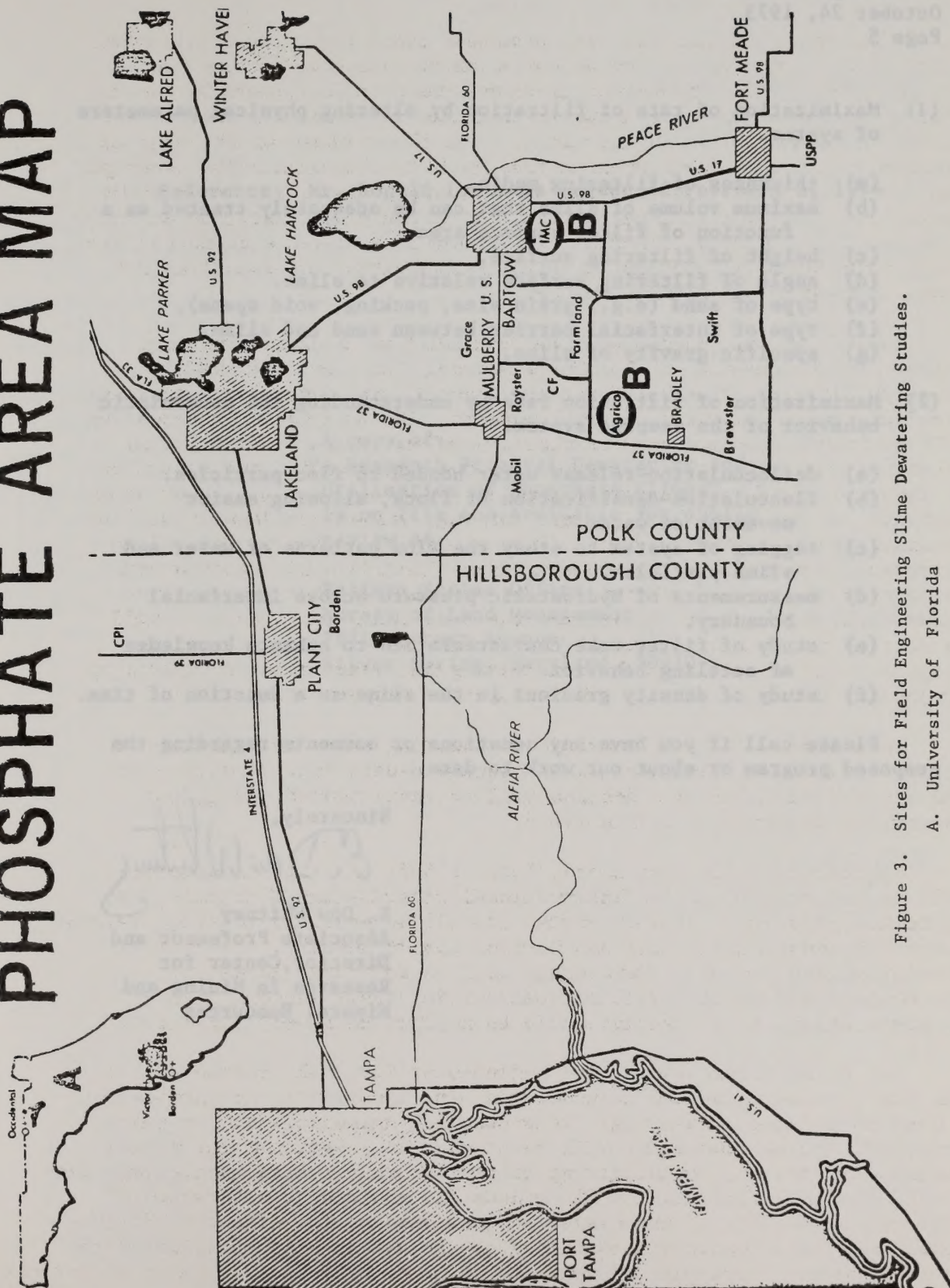


Figure 3. Sites for Field Engineering Slime Dewatering Studies.

A. University of Florida

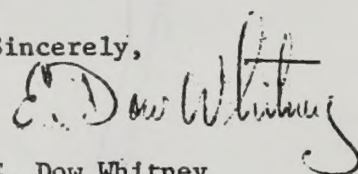
B. Field engineering site

Dr. George T. Tsao
October 24, 1973
Page 5

- (1) Maximization of rate of filtration by altering physical parameters of system.
 - (a) thickness of filtering media.
 - (b) maximum volume of slime that can be adequately treated as a function of filter surface area.
 - (c) height of filtering surface.
 - (d) angle of filtering surface relative to slime.
 - (e) type of sand (e.g., grain size, packing, void space).
 - (f) type of interfacial barrier between sand and slime.
 - (g) specific gravity of slime.
- (2) Maximization of filtration rate by understanding the mechanistic behavior of the seepage system.
 - (a) deflocculation-release water bonded to floc particles.
 - (b) flocculation-densification of flocs, allowing easier movement of water.
 - (c) tagging of system to study the flow patterns of water and slime particles.
 - (d) measurements of hydrostatic pressure across interfacial boundary.
 - (e) study of filter cake characteristics to enhance knowledge of settling behavior.
 - (f) study of density gradient in the slime as a function of time.

Please call if you have any questions or comments regarding the proposed program or about our work to date.

Sincerely,



E. Dow Whitney
Associate Professor and
Director, Center for
Research in Mining and
Mineral Resources

January 17, 1974
4761, 12 Avenue

Florida Times Union
111 W. 1st
Gainesville, Florida

Reference: Mr. Ronald Loehmans letter of February 5, 1974

A copy of:
"A Research Proposal Dewatering and
Utilization of Phosphate Slimes"
is on file and available for public
review at:

Eastern States Office
Bureau of Land Management
7981 Eastern Avenue
Silver Spring, Maryland 20910

SIERRA CLUB

FLORIDA CHAPTER

January 21, 1974

Florida Times Union
711 N. W. 1st
Gainesville, Florida

Sir:

Your January 18 report of the Lake City phosphate leasing hearings contains an inaccuracy in a statement attributed to me. To illustrate the volume of waste by-products that would be produced by the proposed mining I stated that if this material were spread evenly over Columbia County it would cover it to a depth of about six inches. I did not state, nor did I intend to imply, that an actual spill would be of this magnitude. A typical mining operation stores its waste slimes in many different ponds so that a single dam break might spill only the slimes in that particular pond. This is not intended to minimize the potential damage which could be caused by a spill. As I pointed out in my statement, the Dec. 3, 1971 break in a 250 acre holding pond in the Cities Service Fort Meade plant dumped over a billion gallons of slimes into the Peace River. The potential for damage of this sort on the Suwannee River is one of the reasons the Florida Sierra Club has apposed the granting of strip mining leases in the Osceola National Forest.

Yours truly,

Ronald Loehman

Ronald Loehman
Florida Chapter
Sierra Club

REL:bam



SIERRA CLUB

FLORIDA CHAPTER

January 21, 1974

Mr. Maywood Chesson
General Manager
Occidental Chemical Company
P. O. Box 300
White Springs, Florida 32096

Dear Mr. Chesson:

This letter is in response to the visit you, two of your associates at Occidental and Dr. Les Bromwell of the Florida Phosphate Council paid to me and Drs. Onoda and Whitney Friday afternoon January 18, 1974. As you will recall, you were concerned about statements I had made on behalf of the Florida Sierra Club at the January 17 Lake City hearings on the draft environmental impact statement on phosphate leasing in the Osceola National Forest. Your primary concern seemed to be over alleged inaccuracies in my statement as reported to you by your associates. After much discussion the only concrete objections you voiced were over a report mentioning my statement in the Florida Times Union, and over my statements concerning reclamation efforts by the industry. Upon being read the Times Union article I admitted I was misquoted and agreed to write a letter to the editor setting the record straight. Your disagreement over my reclamation statement eventually boiled down to one of definition: the Sierra Club considers reclamation to have been accomplished only when the mined land has been reconstituted substantially back to the state it exhibited before the mining took place. As I understand your position, you consider the land to be reclaimed if it can be put to any commercial use once the work has been done. You did not disagree with my claims given our understanding of reclamation.

Other discussion concerned mostly philosophy and values and to my recollection no other alleged factual errors were discussed. I repeatedly emphasized to you at the meeting that I made the statement as an individual representing the Florida



January 21, 1974

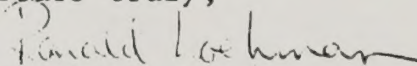
Sierra Club, in a lawful exercise of my rights as a citizen. I also repeatedly urged you or Dr. Bromwell to take advantage of the same opportunity that all citizens and groups have to present their views on the proposed phosphate leasing at the hearings in Tallahassee. As I stated at our meeting, I feel no obligation to present the phosphate companies' point of view since I do not represent them nor am I employed by them. I also pointed out to you that my statement concerned only the Osceola leases; I made no statements about any present member of the Florida Phosphate Council. Only by implication could you feel that your company's interests were harmed by my statements on the lack of success in reclamation efforts.

To meet your objections in a spirit of good will I have written a letter to the editor of the Times Union. A copy is enclosed. You may make any use of it you wish with the stipulation that if you quote it that it is quoted in its entirety. Furthermore, if you can convince me with factual data of the inaccuracy of any statement I made at the hearing I will write a revised statement and send it into the hearing record. By law these must be given equal weight to any oral statement. I would be very interested to receive factual information concerning the nature and extent of the reclamation which you stated has been accomplished. Evidence for reclamation would be a measure of productivity on the land in question before and after mining. The most general data for agricultural land would be on energy flow; i.e., cal/m²/year before and after. Other measures would be the number of animal unit months, before and after, for rangeland, board feet of timber per acre per year for timberland, or even a count of the number of plant ~~and~~ species present before and after. I would need to know the total number of acres involved, what fraction of the total mined area they constitute, and how long after mining the data were taken. I believe that only by looking at hard data can the question of the success of reclamation be resolved. Factual data on any other alleged inaccuracy in my statement will be appreciated.

Copies of this letter are being sent to Les Bromwell, to the hearing record for the Osceola leases, to the Sierra Club attorneys and to my personal attorney.

I appreciate the opportunity we had to talk to you Friday. I regret the unfortunate misquote; I believe it was due more to the difficulty non-technical people have with numbers than to maliciousness on the reporter's part.

Yours truly,


Ronald Loehman
Florida Chapter
Sierra Club

REL:bam



The University of Oklahoma

770 Van Vleet Oval, Room 19 Norman, Oklahoma 73069

January 2, 1974

Oklahoma Biological Survey
405-325-4034

Director, Eastern States Office
Bureau of Land Management
7981 Eastern Avenue
Silver Spring, Maryland 20910

Dear Sir:

I read with interest the Draft Environmental Impact Statement for leasing land in Osceola National Forest for phosphate strip mining. One part of my Ph.D. dissertation done in the department of Environmental Engineering Sciences at the University of Florida was concerned with the Environmental Impacts of phosphate mining in Polk County, Florida.

Although your draft statement is complete and well done in the traditional sense, one further step in the analysis would yield a quantitative answer to the two basic questions involved: 1. Will North Florida be in a better competitive position with or without the mining. Determining its competitive position involves evaluating the trade offs between decreased productivity of the land (measuring the work done for North Florida by nature, work that is free) versus the increased value to North Florida resulting from the existence of major industry. 2. When all the energy costs of strip mining, processing, and transporting the ore are evaluated, is the amplified value of the phosphate (e.g., its value in increasing crop yields) more than the energy costs of mining it.

A method for evaluating these questions has been developed by H.T. Odum, graduate research professor at the University of Florida. Examples of its use for Environmental Impact Statements in Florida and elsewhere are:

Odum, H.T., C. Littlejohn, and W.C. Huber. 1972. An Environmental evaluation of the Gordon River Area of Naples, Florida and the impact of developmental plans. Report to the county commissioners of Collier County, Florida.

Odum, H.T., T. Ahlstrom, S. Brown. 1973. Energy resources for Florida at 10 million people. A paper submitted to the Division of Planning of the Florida Department of Administration for their Scenario 10 Million.

Odum, H.T. 1973. Models and Measurements for Determining the Role of the Power Plants At Crystal River in the Coastal System of Florida. Fla. Power Corporation

I have enclosed a summary of the rationale and calculation done for Polk County to answer question number one.

If you are interested in further explanation of these methods or in expanding the Impact Statement to include this analysis, I would be happy to be of assistance.

Sincerely,

Martha W. Gilliland

Martha W. Gilliland

Excerpted from:

Hillland, Martha W. 1973. Man's Impact on the Phosphorus Cycle in Florida.
Ph.D. dissertation, Dept. of Environmental Engineering Sciences,
U. of Florida, Gainesville, Fla.

Energy Value of Phosphate Mining in Polk County (Fig. 42)

To complete the analysis of man and the phosphorus cycle in Florida, the energy budget of Polk County for the present condition (Table 9) and for the condition without the mining industry (Table 10) was calculated. Figure 42 gives the main energy and money flows in the county; Tables 9 and 10 describe the flows; and notes in Appendix A explain their derivation.

In regions under pressures of population increase, industrial development, or, as in this case, extensive mining operations, questions arise as to how best to use the land. What proportion of developed ecosystems to natural ecosystems maximizes the quality of life. Odum (1971) defined a theory of value based on the work done by the system where maximizing work values assures system survival. Odum and Odum (1972) proposed that quality of life is maximized when land uses are adjusted so that the sum of the value of natural ecosystems, developed ecosystems, and diversity interactions between the two is highest. In one model simulated in an environmental impact study of the Gordon River area near

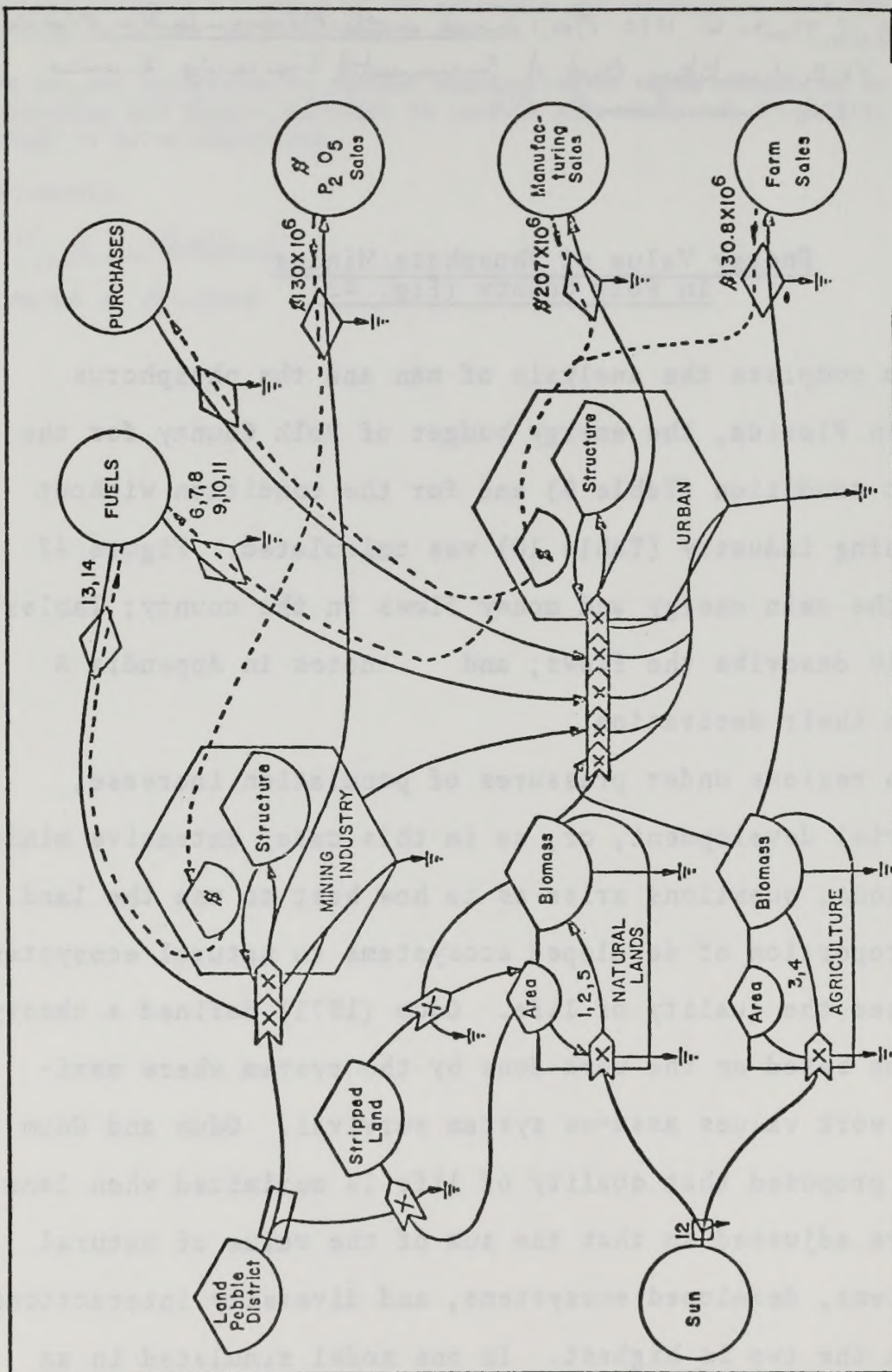


Figure 42. Systems model of Polk County, Florida, showing the main energy and money flows.

Table 9
Energy Values in Polk County for the Present Condition

Pathway on Fig. 42	Name of Flow	Area ^a (acres)	Work ^b (kilocalx106/ acres/year)	Work for County ^c (kilocalx10 ¹¹ / year)	Dollar ^d Equivalent (million dollars/year)
Undisturbed land					
1	Water	120,000 ^a	32.8 ^f	39.3	393
2	Pine flatwoods	36,000	60.0 ^g	21.6	216
12	Heat gradients from the sun*				
	Nature's metabolic work on managed areas				
3	Pasture	875,400 ^a	10.1 ^h	88.4	884
4	Cropland	189,570 ^a	21.4 ⁱ	40.5	405
5	Stripped land	50,000 ^e	5.0 ^j	2.5	25
	Subtotal			192.3	1,923

Table 9 (continued)

Pathway on Fig. 42	Name of Flow	Area ^a (acres)	Work ^b (kilocalx10 ⁶ / acres/year)	Work for County ^c (kilocalx10 ¹¹ / year)	Dollar Equivalent (million dollars/year)
Urban					
6	Electricity			20.0 ^k	200
7	Natural gas			23.9 ^l	239
8	Kerosene			1.2 ^m	12
9	Bottled gas			2.7 ⁿ	27
10	Gasoline			34.0 ^o	340
11	Food			2.0 ^p	20
Mining industry					
13	Natural gas			18.9 ^q	189
14	Electricity**			21.0 ^r	210
	Subtotal			<u>123.7</u>	<u>1,237</u>
	Total			316.0	3,160

*The heat gradients on land from the sun contribute to the natural work (e.g., microclimate); at present, the methodology for calculating this is unclear. Wind is also contributing work from the larger circulation of the atmosphere.

**Although electricity is a higher grade energy, it is added directly to the gas fuels since its concentration takes place outside the system.

Table 10
Energy Values in Polk County Without the Phosphate Mining Industry

Pathway on Fig. 42	Name of Flow	Area ^a (acres)	Work ^b (kilocalx10 ⁶ / acres/year)	Work for County ^c (kilocalx10 ¹¹ / year)	Dollar ^d Equivalent (million dollars/year)
Undisturbed land					
1	Water	120,000 ^a	32.8 ^f	39.3	393
2	Pine flatwoods	86,000 ^a	60.0 ^g	51.6	516
12	Heat gradients from the sun*				
	Nature's metabolic work on managed areas				
3	Pasture	875,400 ^a	10.1 ^h	88.4	884
4	Cropland	189,570	21.4 ⁱ	40.5	405
	Subtotal			219.8	2,198

Table 10 (continued)

Pathway on Fig. 42	Name of Flow	Area ^a (acres)	Work ^b (kilocalx10 ⁶ / acres/year)	Work for County ^c (kilocalx10 ¹¹ / year)	Dollar ^d Equivalent (million dollars/year)
Urban					
6	Electricity**			20.0 ^k	200
7	Natural gas			23.9 ^l	239
8	Kerosene			1.2 ^m	12
9	Bottled gas			2.7 ⁿ	27
10	Gasoline			34.0 ^o	340
11	Food			2.0 ^p	20
	Subtotal			<u>83.8</u>	<u>838</u>
	Total			303.6	3,036

*The heat gradients on land from the sun contribute to the natural work (e.g., microclimate); at present, the methodology for calculating this is unclear. Wind is also contributing work from the larger circulation of the atmosphere.

**Although electricity is a higher grade energy, it is added directly to the gas fuels since its concentration takes place outside the system.

Naples, Florida, Odum, Littlejohn, and Huber (1972) found that about 50% undeveloped and 50% developed ecosystems gave the highest regional value for that area. This distribution had higher total value than either the primitive condition or the fully developed condition. This is because the natural systems do not require maintenance by man, do not exert an economic load on the economy and, in fact, do work for man in providing waste control, water control, noise control, soil maintenance, microclimate, and recreation. Value calculations for a region often omit the work these natural systems do for the region. This is because we do not pay for nature's services with money. Value calculations which ignore nature's work obscure the true worth and costs within a system. Rather than the artificial dollar value, a natural measure of value is the energy budget of the system, whether it be urban or wilderness. The work of machines and people can be evaluated in some energy unit such as kilocalories. Similarly, a measure of the energy budget of a natural ecosystem is its gross primary productivity in kilocalories per acre per year (flow of chemical potential energy after sunlight is caught and concentrated). When these calculations are made, large energy values are found on land and in waters. By the theory, maximizing all energy contributions including those from natural systems will insure the long-range economic stability of a region. Present values for Polk County are given in Fig. 42.

In Polk County, as higher percentages of land are developed and strip mining denudes more land, natural areas may become in short supply. Their work contributions which were taken for granted may then have to be made up from the urban energy sector. This concern is manifested in the recent pilot scale attempts by the mining industry to reclaim wasted land so that it can again do its work for the county.

For present conditions in Polk County, the energy budget of the urban sector was 39% (Table 9) of the total budget (non-urban was 61%). The mining industry brings in fuels (urban energies) at the rate of 39.9×10^{11} kilocal/year (Table 9); however, losses in natural energies occur due to stripping the land at a current rate of 4,500 acres/year (Mr. Homer Hooks of the Florida Phosphate Council, personal communication). The loss due to the decreased productivity of the 50,000 acres previously stripped amounts to 27.5×10^{11} kilocal/year. For comparison, the energy budget of Polk County without the mining industry was calculated (Table 10); total energies were 303.6×10^{11} kilocal/year, of which 27.6% were urban. Total energies for the present conditions with mining were 316.0×10^{11} kilocal/year, which is 12.4×10^{11} kilocal/year higher than without mining. The implication is that Polk County is relatively undeveloped and the metabolic losses from the denuded land can be absorbed by the system, since there are extensive agricultural and natural areas. At the current rate of stripping land, however, within five to ten years the total energies for the county without phosphate mining will be higher than with mining.

Notes to Tables 9 and 10

- a. Florida Statistical Abstract (1971).
- b. Gross primary production estimated from measurements of similar areas from published literature.
- c. Either calculated for Polk County or as the product of acres and gross primary production per acre.
- d. Annual contribution in dollar equivalents estimated by dividing work for the county (note c) by 10,000 kilocal/\$, which is the ratio of GNP to fuel usage in the U.S. economy (H. T. Odum, personal communication).
- e. At the present production rate of 110×10^6 tons rock/year, 4,500 acres are stripped per year (Mr. Homer Hooks of the Florida Phosphate Council, personal communication) or 24,660 tons rock/acre. Total rock mined is $1,694 \times 10^6$ tons (U.S. Bur. Mines, 1930-1970) or 68,000 acres with $3/4$ in Polk County or 50,000 acres.
- f. E. P. Odum, 1971, p. 51.
- g. Pinelands metabolism from Woodwell (1968) is 40 kilocal/m²/day or 60×10^6 kilocal/acre/year.
- h. Pasture metabolism is 2,500 kilocal/m²/year (E. P. Odum, 1971) or 10.1×10^6 kilocal/acre/year.
- i. From Odum, Littlejohn, and Huber (1972).
- j. Taken as half of pasture metabolism (note e).
- k. Supplied by Florida Power to Polk County, excluding mining industry, is 493×10^6 KWH or (at 860.5 kilocal/KWH) 4.2×10^{11} kilocal/year (Peyton of Florida Power, personal communication).

Supplied by Tampa Electric to Polk County, excluding mining industry, is 6.6×10^{11} kilocal/year (Mr. Bill Campbell of Rates and Research, Tampa Electric, personal communication).

Lakeland and Bartow with a population of 110,000 supply their own. At 10,000 KWH/person (Fla. Stat. Abst., 1971) this is 9.46×10^{11} kilocal/year.

Total electricity to Polk County, excluding that used by the mining industry, is $4.2 + 6.6 + 9.46 \times 10^{11}$ or 20×10^{11} kilocal/year.

1. Personal communication by letter from Mr. C. F. Guinn of Florida Gas gives 9.5×10^{12} BTU per year for 1972 or 23.9×10^{11} kilocal/year.
- m. Kerosene used in Polk County in 1972 is 4,398,527 gallons (Mr. Ray Rutledge, Revenue Officer, Tallahassee, personal communication). At 3.86×10^3 mg/gal, .7 g/ml, and 10 kcal/g, this is 1.2×10^{11} kilocal/year.
- n. The LP and propane gas supplied statewide in 1972 was 350×10^6 gal (Sid Stapleton, personal communication). Polk County represents 1/35 of the state's population or a use of 10×10^6 gal. At .7 g/ml and 10 kcal/g, this is 2.7×10^{11} kcal/year.
- o. 126,056,460.9 gal/year used in Polk County (Mr. Lew Thomas, State Department, Tallahassee, personal communication). At 3.86×10^3 ml/gal, .7 g/ml, and 10 kcal/g, this is 34.0×10^{11} kilocal/year.

p. $2,500 \text{ kcal/person/day} \times 365 \text{ days/year} \times 227,222 \text{ people}$
 $= 2.0 \times 10^{11} \text{ kilocal/year.}$

q. Personal communication by letter from Mr. C. F. Guinn
of Florida Gas gives $7.5 \times 10^{12} \text{ BTU}$ for 1972 or 18.9×10^{11}
kilocal/year.

r. Tampa Electric (Mr. Bill Campbell, personal communica-
tion) supplies 1,634,393,000 KWH/year to phosphate
industry; Florida Power (Mr. Peyton) supplies 839,000,000
KWH/year to phosphate industry. Summing and multiplying
by 860.5 kcal/KWH yields $21.0 \times 10^{11} \text{ kilocal/year.}$

BILL GUNTER
5TH DISTRICT, FLORIDA

COMMITTEES:
AGRICULTURE
FORESTS SUBCOMMITTEE
LIVESTOCK AND GRAINS SUBCOMMITTEE
SCIENCE AND ASTRONAUTICS
ENERGY SUBCOMMITTEE
MANNED SPACE FLIGHT SUBCOMMITTEE

Congress of the United States
House of Representatives

Washington, D.C. 20515

January 21, 1974

WASHINGTON OFFICE:
423 CANNON HOUSE OFFICE BUILDING
(202) 225-2176

DISTRICT OFFICES:
1600 WEST COLONIAL DRIVE
P.O. BOX 386
ORLANDO, FLORIDA 32802
(305) 843-2030

PASCO COUNTY COURTHOUSE ANNEX
P.O. BOX 1175
NEW PORT RICHEY, FLORIDA 33552
(813) 848-1910

Director, Eastern States Office
Bureau of Land Management
7981 Eastern Avenue
Silver Spring, Maryland 20910

Dear Sir:

This is in response to your covering letter attached to the draft environmental impact statement with respect to phosphate leasing on the Osceola National Forest and coded 1792 (910), in which you solicit comment with respect to the proposed statement and alternative actions contemplated.

As a member of the Forests Subcommittee of the House Agriculture Committee and of the Congress, representing the Fifth District, I would like to go on record as being strongly and vigorously opposed to the issuance of any leases permitting phosphate mining on any portion of the federal lands in the Osceola National Forest.

Such phosphate mining, it is apparent from the proposed draft environmental impact statement itself, would represent an unconscionable threat to a water supply aquifer on which Florida is heavily and absolutely dependent, and at a time of increasingly serious indications of overall fresh water shortages and the prospect of even more severe future scarcity. To take such risks when phosphate mining in this particular area is not only unnecessary but would yield only minimal returns, at the same time vast deposits of phosphate in the Western United States remain untapped, I believe is unacceptable, both to the people of Florida, increasingly hard-pressed to conserve such basic resources as water and room available for recreation, and from the standpoint of any common sense planning and allocation of priorities.

Accordingly, I will take such legislative action at the appropriate time as may be required to preserve the

Osceola National Forest for the use, benefit and enjoyment of the people of Florida, and most particularly to safeguard the underground water reservoirs, springs, wells, channels and the Floridan Aquifer. It would be my hope, based on the findings contained in the draft statement itself, that such legislative action shall not even prove necessary.

While I personally pretend to no special expertise, I do believe the language of the draft impact statement itself is more than clear enough, as indicated from the following excerpts:

"The Floridan aquifer is capable of providing large quantities of ground water for municipal, industrial, and agricultural use, and is the principal source of ground water through all of northern Florida and southern Georgia. Natural discharge from the Floridan aquifer maintains the perennial, or base, flows of the Santa Fe, Ichatucknee, and Suwannee Rivers in northern Florida." (II-50)

"Each drainage listed contributes high quality water to the watershed." (II-101)

"The mining operations would bisect several streams resulting in altered drainage characteristics. Approximately 31.5 miles of streams on National Forest land would be bisected, causing interruptions and diversions of the normal, orderly streamflow." (III-11)

"Approximately 34 % of the total National Forest watershed area tributary to the Suwannee River eventually would be mined..." (III-11)

"The downstream effects to larger or major watersheds might be in the form of chemical or sediment pollution." (III-48)

"Withdrawals of water from the Floridan aquifer would lower the potentiometric surface over relatively large areas and affect water systems of Lake City and other users in the area." (V-3)

"A reduction in the storage water available in the shallow aquifer and a reduced water table would adversely

affect the various resources for the duration of mining in the Forest (30 years)." (VI-3)

"Some of the interrelationships in the cycles and flows that link the components of the ecosystem are not known or understood." (III-1)

"Mining would require 135,000 gallons of water per minute (24 hours/day - 7 days/week) of which about 90 per cent would be recovered and recycled. Dewatering the shallow aquifer would be required during mining operations. Consumptive use of water would be about 13,500 gallons per minute... Mining pits would intersect the shallow aquifer and possibly the secondary artesian aquifer...Dewatering would reduce the quantity of ground water in the shallow aquifer and possibly in the secondary artesian aquifer...Depression of the shallow aquifer by dewatering would reduce recharge to the Floridan aquifer. If the water table is depressed below the potentiometric surface, the direction of intermovement of water between the aquifers would be reversed, and water from the underlying Floridan aquifer would tend to move upward into the shallow aquifer and possibly into the mining pits. This would tend to deplete the Floridan aquifer." (III-17-19)

Numerous other such references contained in the draft impact statement further indicate the grave effects which might be expected with reference to the volume and quality of water remaining in the Floridan aquifer following mining operations. These operations, the draft statement indicates, would consume 20 million gallons of water a day, seven days a week, year after year, that could not be recycled and would need to be replaced from the grounds under the Osceola.

Mining operations would also require, during this time of energy shortage, vast amounts of electric power estimated at 400 million KWH. As the report notes, "Without additional power supplies electrical brown-outs and black-outs could occur. These power shortages could create economic and social impacts." (III-42)

Moreover, the threat of pollution caused by mining operations poses equal hazards, as the statement notes: "The byproduct wastewaters from the production of chemical fertilizers would pollute surface waters." And: "Pits as large as 400 feet wide, one mile long, and 30 to 40 feet

deep would be constructed for mining operations. This could create major impacts of long term duration." (III-17)

The report also notes: "Slime pit-dams in conjunction with ore processing pose a threat of pollution, sedimentation, and flooding in downstream areas should a break occur. Current practices employ small safety dikes around the pits and periodic inspections. The probability of a break occurring is difficult to predict. However, on March 11, 1967, an earthen dike near the Peace River in central Florida burst, releasing between 1000 and 1500 acre-feet of 'slime' into the river. Nearly all aquatic life in a 76-mile stretch to the river's mouth succumbed." (III-16)

It seems apparent permitting such mining operations is clearly one way not to preserve and safeguard the critically important Floridan aquifer system on which the State is increasingly so dependent.

I have not even discussed the wide variety of other harmful effects which the draft statement so clearly indicates exist. They range from the local impact of withdrawing some 10-12,000 acres of private timber lands to -- as the report indicates -- "accommodate slimes," to the intrusion into many endangered species habitats.

In this instance, the impact on recreational use is also clear and of major importance, given the size of the contemplated mining operations. The draft statement correctly states that the Osceola "is ideally situated to serve the outdoor forest recreation needs of metropolitan Jacksonville, a city of 550,000, only 35 miles to the east." Yet: "Phosphate development would affect 1/5 of the Osceola National Forest, changing it to an industrialized area for at least 30 years." (VI-7)

And: "With approximately one-third of the mined areas being left in water-filled pits, it can be assumed that an equal land area would be lost for land based recreation opportunities such as hunting, camping, picnicking and hiking." (III-38)

In all, leases to mine 52,000 acres of the 157,000 federal acreage in the Osceola are involved, with phosphate deposits believed to exist on at least 28,000 acres. On this scale, what is contemplated is little short of simply transforming most of the Forest -- which counted 161,500

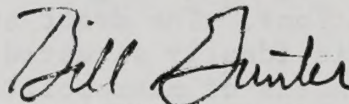
BLM Eastern Office - Page 5

visitor days last year -- into a smokey and polluted sludge and slime pit -- for the next 30 years, imperiling one of Florida's few remaining fresh water supply sources in the process.

Yet, at the same time, the impact statement describes ample phosphate deposits in the Western United States expected to satisfy that regions requirements "well beyond" the Year 2000 -- and growing demands for export of phosphate from the United States. In terms of Florida's phosphate industry, the amount produceable from the Osceola would seem minimal at best. Weighed against the virtual loss of the Osceola for other purposes and the threat to the State's water supply, it is hardly imperative. Indeed, given that threat to our water supply, it seems to me imperative that the Osceola not be opened to phosphate mining.

For all these and other reasons, I urge as strongly as possible that phosphate mining be disapproved on any and all federal lands in the Osceola National Forest.

Sincerely yours,

A handwritten signature in cursive script that reads "Bill Gunter".

BILL GUNTER, M. C.
Fifth District, Fla.

BG/mdg

Testimony of the Hon. William Lehman
Representative from Florida before the
U.S. Department of the Interior
Bureau of Land Management

February 8, 1974

Thank you for the opportunity to present my views on the proposed issuance of phosphate leases within the Osceola National Forest.

From the environmental impact statement which I have read, and the persons to whom I have talked, there is agreement on one point. Phosphate strip mining in the Forest would be an ecological catastrophe. Slime pits varying in depth from fifteen to forty feet would be formed within and just outside the boundary of the Forest. Almost 1,800,000 board feet of timber per year would be lost forever because 9,000 acres of the Forest would become lakes. The vegetation, consisting primarily of flowering hardwood trees, would disappear and with it, the ecological system it is the basis for. The Florida panther and bear, not to mention the bald eagle and red cockaded woodpecker, all of which are endangered species, would be driven from one of their few remaining homes. The experts say that the bear and panther would probably never be able to return, and it would take at least fifty years for the woodpeckers to be able to live in the Forest again.

Because the phosphate processing plant, which would be built on 95 acres of private land, will use 200,000,000 gallons of water per day, the water pressure in the surrounding communities

will drop. The municipalities will be forced to build pumping facilities to handle the difference. If the situation were short term, that might be acceptable, but we are talking about thirty years of mining, a suggestion I can't accept.

Perhaps the most damaging part of this, from an ecological view, is the effect on the land. In strip mining, the rich top soil and plants are ripped away and the ore-bearing rock is torn from its resting place. The long term effect is to poison the whole area. Minerals and chemicals which through hundreds and thousands of years have separated themselves are now thrown back together again. The result is a different composition soil that the experts say will not support the flowering hardwoods and other plants now on the 23,500 acres that will be mined. The reclamation of the landscape is an uncertain proposition at best, the experts say. "The most significant unavoidable impact to forage is the disturbance of soil and site which support the native forage species. Although the mining pits could be backfilled to the original ground level, the change in the physical make-up of the soil would probably require replacing native forage species with introduced species. Maintenance of the artificially introduced species would likely require continued maintenance of fertility levels with commercial fertilizer applications." (Environmental Impact Study, p. V-7, emphasis added)

Despite this obviously unacceptable situation on reclaimed land, remember 9,000 acres or almost 40 percent of the land mined won't be reclaimed at all; it will be under water and slime.

Is there anything worthwhile in allowing the mining? Yes, the companies seeking the leases would find it more efficient because it would give them thirty years of mining. Thus they can amortize the cost of their equipment and production over a longer period of time and of course it guarantees them a supply of the ore to be mined. This means more jobs in the area, and some revenues generated by royalties returned to local communities. It is worth it? No.

Economically, this country will be in a bind for phosphate in 1995. The experts say in the impact study, "... the gap between export demand and supply will continue to increase until 1995, when the supply of phosphate rock for export will cease to exist." (p. I-12)

With that situation, it can't be considered in the public interest to allow the mining of phosphate on any Federal land, except where national demand for the element requires it.

The long term effect of a decision to lease the Forest lands would be therefore against the public interest for two good reasons.

First, we would be depleting a natural resource we can't replace to guarantee twenty-one years of export profits to a few chemical companies. Later, after 1995, this nation will be searching for a substitute for phosphate chemicals to keep our

agricultural production up. To preserve the Forest until a national need demands the use of public lands is the only logical course. These are national resources, and until the nation needs them, they should be protected, and the deposits on Forest land are not necessary to mining those on private land.

Second, environmentally the state of the art in strip mining and land reclamation has a poor track record. To grant the leases would condemn one-third of the National Forest to an irreversible process that would change its character. There is so little of "Florida" left that every effort should be made to preserve what we have, not destroy it for short term economic gains.

Finally, the ecological damage and its long term effect on the Forest outweighs any economic consideration. The Secretary of the Interior is bound by law to refuse the leases if it is found to be against the public interest. In my opinion, the leases should be withheld at this time. And in the future, when the need for phosphate ore within the U.S. exceeds projected production, then a reconsideration can be made of the request, but not before.

Comments on

Draft Environmental Impact Statement Phosphate Leasing on the

Osceola National Forest, Florida

by

Frank Sedmera

Rt. 3 Box 47

Lake City, Fl.

32055

Lest there be any possible question about my position, let me state it first and foremost. I am against any activity in Osceola National Forest which would stand in the way of the Forest Service following its publicized management plan.

Strip mining for phosphate or other minerals would cause enough alteration of the forest (for many human generations) to interfere with the management plan. The Draft Environmental Impact Statement makes that point many times.

It took the nearly complete depletion of United States forest to impress on people and government the wise conservation and management of our forest resources. History has only reinforced the good sense shown when our National Forests were authorized. The first time that our forests were ravaged the land was left damaged, but not to the extent that it could not recover in a couple of generations. Even the majority of wildlife species have recovered. The strip mining of the land, as the report documents, will have essentially a permanent impact on the land. The mined areas and adjacent areas will never recover to their present condition (particularly the swamps). Even the pine timber areas will require many human generations to approach their present condition. The extensive new water surface will prevent duplication of current conditions.

The justification given for this permanent dismemberment of Osceola is hardly on firm ground, in my opinion. We say that we must have this phosphate if we are to feed world or even U. S. populations. By definition that is not the case, because, within 40-50 years we won't have the phosphate to mine. If we need it now, we shall also need it then. The deposits will last us only three years at current rates of consumption. Clearly what is more correct is that we need to either find a renewable source of agricultural phosphate or we need to produce food without plenty of phosphate.

Thus the issue is: do we destroy 53,000 acres of National Forest, with potential for a renewable supply of wood, pulp, game, potable water and recreation space for as long as we exist, in favor of three years of cheaper-than-normal phosphate OR do we place the proper value on our renewable forest resources and manage them for public good for today as well as future years. I certainly opt for the latter plan and wholeheartedly support research that would attack the food production question.

Now, I do have a number of comments to make and raise questions about the Draft Environmental Impact Statement. The Statement seems generally good as far as it goes. There do seem to be a number of deficiencies, however.

- I -

I note that the jobs related to the mining and production of first products is given as about 700 for the lease operations. In contrast to these jobs being mentioned there is no mention about the jobs currently

being supported by the lease area in its present uses (other than forage). You would certainly need to list jobs up through the production of first products, as was done for phosphate. So jobs like timber harvesting, transportation of products, sawmill operations, pulp and paper mill operations, tourism, sporting goods businesses, personal transportation, etc., should be tallied in the "plus" column for the forest. In addition to this there will be a serious dislocation of employees as the mining ends. There will also be a serious dislocation for the electrical generation station required for the operation. These dislocations are not mentioned in the Statement. They should be.

II

The Statement does not appear to contain reference to any reclaimed areas in Florida where the reclamation practices described in the statement have resulted in a forest with the productivity and character of the lease area. I note the "reclaimed" areas are primarily flattened land with reasonable load-bearing strength. In my opinion the Osceola does not require 44,000 acres of parking lot.

I have been observing demonstration reclamation areas in different parts of Florida. The establishment of vegetation is difficult at best. I have yet to see a forest thriving on such areas.

While it is possible that a commercial forest could be established on such "reclaimed" land I have not seen this demonstrated in fact. Thus I believe that the Statement should be altered when it speaks about "reclaimed" land in forest. It is talking about an experiment in reclamation. This experimentation should be emphasized. The public

is being mislead at the present. Again, it is my opinion that a 53,000 acre experiment is not in the public interest if public land is at stake. Let's have good success at reclaiming private land before we think about touching 53,000 acres of public land.

III

The Statement mentions a 1967 slime spill into the Peace River. Another slime spill occurred in 1971, about $4\frac{1}{2}$ years later. The effects of this later spill are documented in a Florida Game and Fresh Water Fish Commission report of February, 1973.

One billion gallons of clay (slime) was spilled into Whidden Creek and thus into the Peace River. Nearly 200,000 pounds of fish were killed directly. The siltation, especially in saline waters, resulted in reduced food for remaining fish and in reduced reproduction in remaining fish.

In addition the flood plain of Whidden Creek was covered to a depth of about 10 feet, leaving slime deposits of up to six feet upon drainage. These deposits have inhibited the natural purification processes along the river. Water storage capacity for the area has been reduced.

Total monetary value of fish killed and of restocking was about \$900,000. Other damage mentioned has not been given a dollar value. The State of Florida is suing Cities Service for over ten million dollars.

This spill followed a series of documented intentional slime releases into Whidden Creek. Since January 1960, at least five major fish kills have been investigated on the Peace River. Each kill was traced to "careless or negligent phosphate mining operations."

Such a clear and present danger to the Suwannee River should be given greater coverage in the Statement. A similar danger exists for the remainder of Osceola, including Ocean Pond.

IV

The Statement projects the amount of water required to be pumped from the ground each day for the mining and product production. The mere statement of the number of million gallons does not mean very much to a reader. In 1970, the entire population of Volusia County, 170,000 people, only used 18 million gallons of water each day. The mining operation, at best efficiency, will require 20 million gallons per day, just for mining and first product production.

I note that the local water table (perched table) will need to be lowered by some 30 feet in the active pit areas. The Statement seems to indicate that the quality of this water will not be good enough for the mining operation. Thus this water will be drained away. There is no estimate of the number of gallons of water per day that would be pumped for this purpose. Given the generally high water table in Osceola, the volume is surely significant. This volume should be given both in gallons per day and in terms of an equivalent population as I did above.

In closing let me say that I frequently visit Osceola National Forest. I have many friends who do also. The campgrounds contain many people from across the nation and even beyond. While the Statement has not adequately assessed the measurable value of the Osceola

as it currently exists, it falls even further from the mark in assessing the human stress factor. To see the only reasonably accessible public forest destroyed as far as our lifetime is concerned would affect many persons in a most negative way. Hunters became very emotional this past year when they were threatened with further travel restrictions within the forest. What do you suppose will be the reaction when mining begins?

In my opinion the losses are far from covered by three more years of artificially-cheap phosphate. Let's get on with the necessary work of finding a long-term solution to our food production problems. Let's keep Osceola as a multiple-use public forest, capable of serving people far into the future.

X GLOSSARY

Acidulation	The process by which the phosphate rock is converted into phosphoric acid.
Admixture	An ingredient added in mixing.
Apatites	A crystalline mineral having a composition of $\text{Ca}_5\text{F}(\text{PO}_4)_3$.
Apiary	A group of beehives.
Aquifer	A formation, group of formations, or part of a formation that contains sufficient saturated permeable material to yield significant quantities of water to wells and springs.
Areal Extent	The surface area distribution of a material substance, usually expressed in acres.
AUM	Animal Unit Month(s) (One AUM is the amount of force necessary to support one animal for a period of one month.)
Authorized Officer	The designated Federal official in whose jurisdiction the lands involved are situated, who has been delegated authority to act on behalf of the respective Federal agency. Comparable to U.S. Forest Service "Forest Officer."
Baffle Chamber	A chamber with a series of plates which deflect and slow material passing through it.
Beneficiation	The processing of ores for the purpose of (1) regulating the size of a desired product, (2) removing unwanted constituents, and (3) improving the quality, purity or assay grade of a desired product.
Biomass	The total mass or amount of living organisms in a particular area expressed quantitatively.
BOD	An abbreviation for Biochemical Oxygen Demand - a way of measuring the demand for oxygen in a body of water.

BPL	An abbreviation for Bone Phosphate of Lime (1 percent BPL is equivalent to 0.458 percent P_2O_5).
Calcination	The oxidation of ores, concentrates, or residues by heating.
Catalysis	The speeding up or slowing down of the rate of a chemical reaction by the addition of a substance which itself undergoes no permanent chemical change.
Centrifugal Pumps	A form of pump in which water is drawn through the center of a rotating disc and discharged from its circumference into a series of passages of gradually increasing cross sections.
CFSM	An abbreviation for cubic feet per second per square mile.
Chert	A very fine-textured, hard, metamorphosed sedimentary rock having the chemical composition SiO_2 .
Chlorotic	A yellowing, or blanching, of the normally green parts of a plant due to causes other than the absence of light.
Clastic	Usually fragmented rocks or organic structures that have been moved individually from their places of origin.
Coliform Level	Population level of the coliform bacteria in a specified volume of water.
Condenser	An apparatus for converting gases or vapors to a liquid state.
Confining Bed	A body of "impermeable" material stratigraphically adjacent to the one or more aquifers; this term now supplants the terms - aquiclude, aquitard, and aquifuge.
Consumptive (use of) Wildlife	Man's possession of wildlife for sport or food.
Counter Current Dryer	A dryer where the drying air flows in the opposite direction from the material to be dried.

Creel Data	Inventory of the fish catch which fishermen have in their bag or creel.
Cut	A surface opening (excavation) in the ground generally intersecting a vein of ore.
Curie	The basic unit intensity of radioactivity in a sample of material. One Curie equals 37 billion disintegrations per second, or approximately the radioactivity of one gram of radium.
Decant	(See Dewatering)
Dewatering	Refers to (1) The process of pumping the surface and subsurface aquifers to reduce the water table and/or the potentiometric surface to prevent the groundwater from entering the mining pit(s) or any excavation(s); or (2) The "decanting" of surface pond water (in which solids have more or less settled out) from the slime pits.
Dolomite	A sedimentary rock having the chemical formula $\text{CaMg}(\text{CO}_3)_2$.
Draglines	A type of excavating equipment which casts a rope-hung bucket a considerable distance, collects the material by pulling the bucket toward itself on the ground with a second rope, elevates the bucket, and dumps the material on a spoil bank, in a hopper, or on a pile.
Ecosystem	The relationship(s) of a biological community with its physical and chemical (non-living) environment.
Edaphic	Pertaining to or influenced by soil conditions rather than climatic factors.
Effluent	A liquid, solid, or gas (usually waste) discharged into the air, ground, or water.
Electroplating	Depositing metal, through electrolysis, by adhering it upon an object serving as a cathode.
Endangered Species	Those species determined by the Secretary of the Interior to be threatened with extinction and <u>named</u> on the list which is published and amended periodically in the <u>Federal Register</u> .

Estuarine/or Estuary	The wide mouth of a river, where the tide meets the current causing mixing of river water and sea water.
Eutrophication	The "aging" of a body of water (usually a lake) from a "sterile" (nonbiologic) condition to one biologically overloaded (usually indicated by algal blooms) as a result of nutrients and time; the eutrophic water bodies have low dissolved oxygen levels for fish.
Evapotranspiration	The total water loss from the soil, including that by direct evaporation and that by transpiration from the surfaces of plants.
Flotation	The method of mineral separation in which a foam, created in water by a variety of substances, floats certain finely crushed minerals.
Flotation Section	Device by which various sizes of particles are separated by flotation.
Fluid Bed Dryer	A dryer wherein the particles to be dried are supported and dried by a cushion of air.
Forest "Edge" Effect	That fringe area of forest that is adjacent to an opening where wildlife can get refuge and food.
Gangue	The undesired minerals associated with an ore, mostly nonmetallic.
GPD	An abbreviation for gallons per day.
GPM	Abbreviation used for gallons per minute.
Grizzlies	Iron or steel grates used for the coarse screening or scalping of bulk materials.
Hammer Mills	A mill consisting of a rotor, fitted with movable hammers, that is revolved rapidly to break up rocks, clay shales, etc.
Hardpan	A name applied to a subsurface soil layer which has been cemented usually by limonite or some similar bonding material and which generally restricts permeability of water.

Hardwood Bay	A swampy depression or minor drainage which is occupied primarily by hardwood trees and large shrubs many of which have broad leathery evergreen leaves.
Hardwood Hammock	A wooded area usually slightly higher in elevation than surrounding terrain dominated by broad-leaved trees where fire has been kept to a minimum.
Hardwood Stringer	The stand of creek swamp hardwoods that grow along creeks and drainage ways.
Hydraulic Mining	Mining by washing sand and soil away with water which leaves the desired mineral.
Interbasin Transfer	Movement of water between watersheds (surface and/or subsurface water).
Isoclinic	A line connecting all points on a geologic map in which the corresponding principal stresses have the same direction (geologic dip of rock or soil strata).
Isopachous	Lines on maps, charts, etc., in which the shape of a body is indicated by lines drawn through points of equal thickness.
Karst	Limestone region with many sinkholes, abrupt ridges, caverns, and underground streams.
Landscape Character	The character of a landscape is the overall impression created by its unique combination of visual features (such as land, vegetation, water, and structures) as seen in terms of form, line, color, and texture. <u>Page 7, National Forest L.S. Mgt. Vol. I.</u>
Lateral Transfer	Movement of moisture laterally through the soil (usually following the surface land slope).
Limnology	The study of fresh water ponds and lakes.
Log Washers	A slanting trough with a revolving log which contains blades placed at an angle; the blades convey lumps of ore, upward against a current of water, which dissolves out adhering clay.
Mast	Wild nuts and fruits.

Matrix	The subsurface material containing a mineral or metallic ore.
Mean Sea Level (MSL)	The average surface level determined by averaging all stages (heights) of the tide over a 19-year period, usually determined from hourly height readings and referred to a fixed tide level.
Mesh Fraction	That part of a material passing a specified mesh screen and retained by some stated finer mesh.
MGD	Abbreviation used for million gallons per day.
mg/l	Abbreviation for milligrams per liter (see ppm).
Mining Supervisor	The Regional Mining Supervisor, or his authorized representative, of the Geological Survey authorized as provided in 30 CFR 211.3 and 231.2 to supervise operations on the land covered by a permit or lease.
MMTY	Abbreviation for million tons per year.
Non-Consumptive (use of) Wildlife	All of man's uses of wildlife excluding its possession for sport or food. This includes such activities as viewing wildlife for aesthetic enjoyment, photographing wildlife, etc.
MTY	Abbreviation for thousand tons per year.
Muck Soil	Soil composed of thoroughly decomposed black organic material, usually very moist.
Mycorrhiza	The symbiotic association of the mycelium of certain fungi with the roots of seed plants.
Nonartesian Aquifer	An aquifer which is not under pressure.
Overburden	Material, consolidated or unconsolidated, that overlies a deposit of ore.

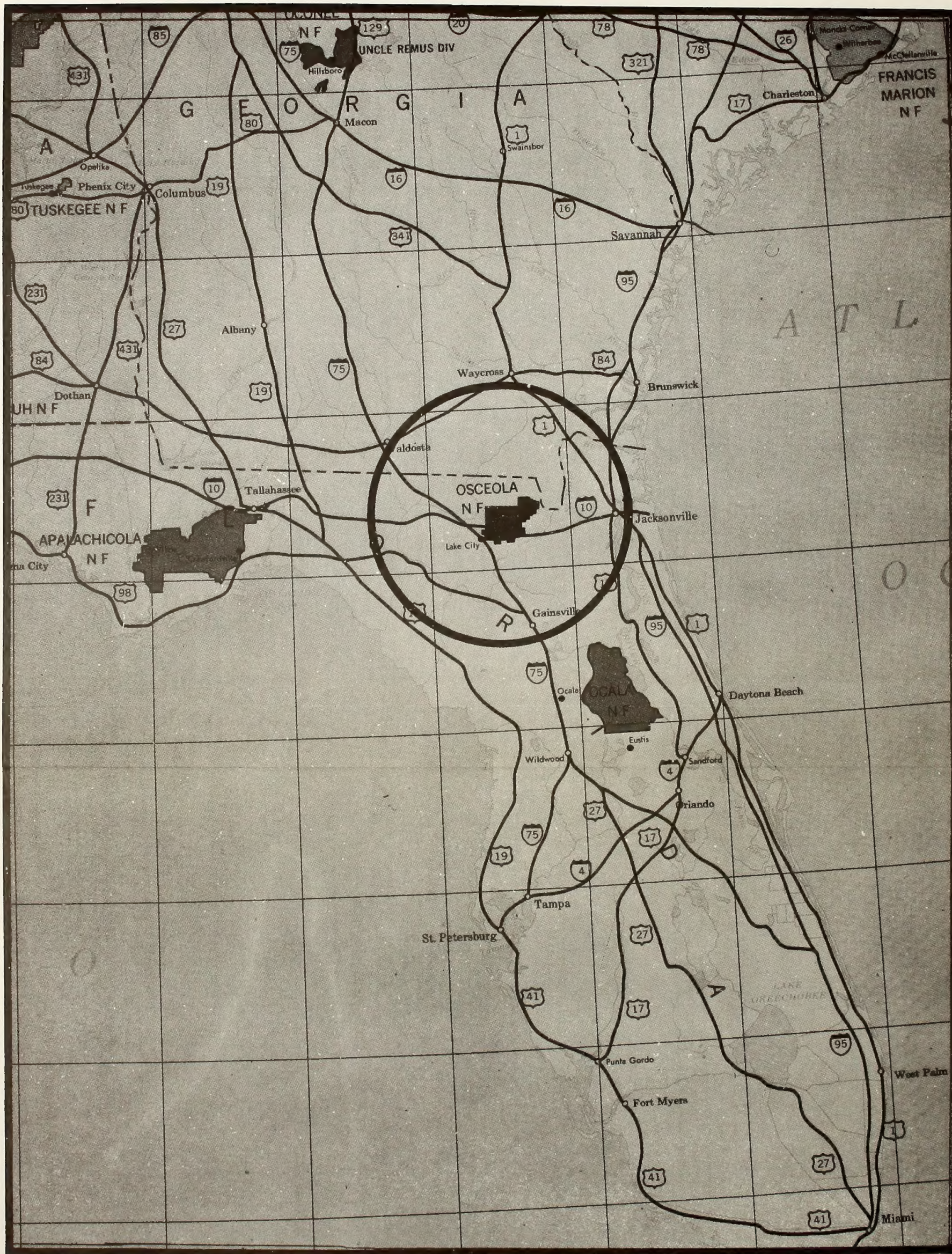
Overstory	The uppermost vegetative "layer" of a forest (usually trees).
Pebble Fraction	Those particles ranging in size from 2 to 64 millimeters.
Percolation	Downward movement of water through openings in rocks or soil.
Phosphoric Acid	A clear, colorless, sparkling liquid having a chemical formula of H_3PO_4 .
Phosphorite	A sedimentary rock composed chiefly of phosphate.
Potentiometric Surface	An imaginary surface that is coincident everywhere with the static level of the water in an aquifer - the level to which water will rise in tightly cased wells (formerly piezometric).
Porosity	The ratio between the volume of the void (pore) space of a material (soil, rock, etc.) to the entire volume of the material.
ppm	Abbreviation for parts per million (equivalent to mg/l).
psig	Abbreviation for pounds per square inch, gage.
Recharge	The processes by which water is absorbed by the soil or rock material and added to the zone of saturation (i.e. recharge to aquifer).
Red Book	Resource Publication 114 by USDI, revised March 1973. Lists species considered to be threatened with extinction.
Riparian Vegetation	Vegetation dependent upon the moist zone adjacent to or on the bank of a river or other body of water.
Rookery	Nesting or breeding area for birds.
Rotary Gas or Oil Direct-Fired Parallel Flow Dryer	A rotating gas or oil heated dryer wherein the material and the drying gasses flow in the same direction.
Screw Feeder	An auger-type screw to transfer material from one piece of equipment to another.

Sediment	Solid material settled from suspension in a liquid.
Sedimentation	The process by which solid particles are separated from a liquid, as a result of either gravity (settling) or centrifuging (spinning).
Settler	A tub, pan, vat, or tank in which a material in solution settles to the bottom allowing the liquid to be skimmed off (or decanted).
Silicified	Made into silica; usually refers to silicifying organic remains, both plant and animal.
Slag	A substance formed by chemical action and fusion at furnace operating temperatures.
Slime	Residue from ore production reduced to a very fine powder and held in suspension in water so as to form a kind of thin mud.
Slurry	Any finely divided solid usually mixed with water to form a viscous liquid.
Spoil (Piles)	The overburden or non-ore material removed in gaining access to the ore or mineral material in surface mining.
Stampage	The marketable value of standing timber.
Submerged Combustion Process	"Burning" process in which elemental phosphorus is combined with oxygen under water.
Sump	A pit or pool at the bottom of a mine or shaft in which water collects and from which it is pumped.
Tailings	The part or parts of a fluid material separated as refuse or separately treated as inferior in quality or value; leavings, remainders, or dregs.
Threatened Species	Wildlife species that are likely to become endangered. (See endangered.)
TPY	Abbreviation for tons per year.

Transmissivity	The property of an aquifer to allow water to move through it; it is the rate at which water of the prevailing kinematic viscosity is transmitted through a unit width of the aquifer under a unit hydraulic gradient.
Triple Super-Phosphate	Any of various commercial phosphate fertilizers obtained as white to gray granules or powders by acidulating ground insoluble phosphate rock.
Trophic	An organisms food level or position in the producer-consumer structure of an ecosystem.
Turbidity	The suspended material in a liquid; muddiness or cloudiness; measured usually by the liquid's light transmissibility.
Venturi	A constriction in a pipeline or duct to speed up the fluid and lower its static pressure.
Visitor Day	One visitor day equals twelve-hours use.
Volatilization	The process of changing a liquid into a gas.
Water Budget	The quantitative characterization of all water (inflow vs. outflow) in a watershed.
Watershed	The area contained within a drainage divide which contributes flow to a specified point on a stream. The area drained by a river or stream.
Water Table	The upper limit or surface of the saturated portion of the nonartesian aquifer which follows (approximately) the profile of the land surface.
Wet Processing Operation	A process in which the valuable contents of the matrix is separated from the undesirable minerals.
Wet Scrubber Unit	A closed system which captures dust particles by wetting them, thus causing them to fall into a collection container or area.
Winnow	To separate out such as by air or water currents.

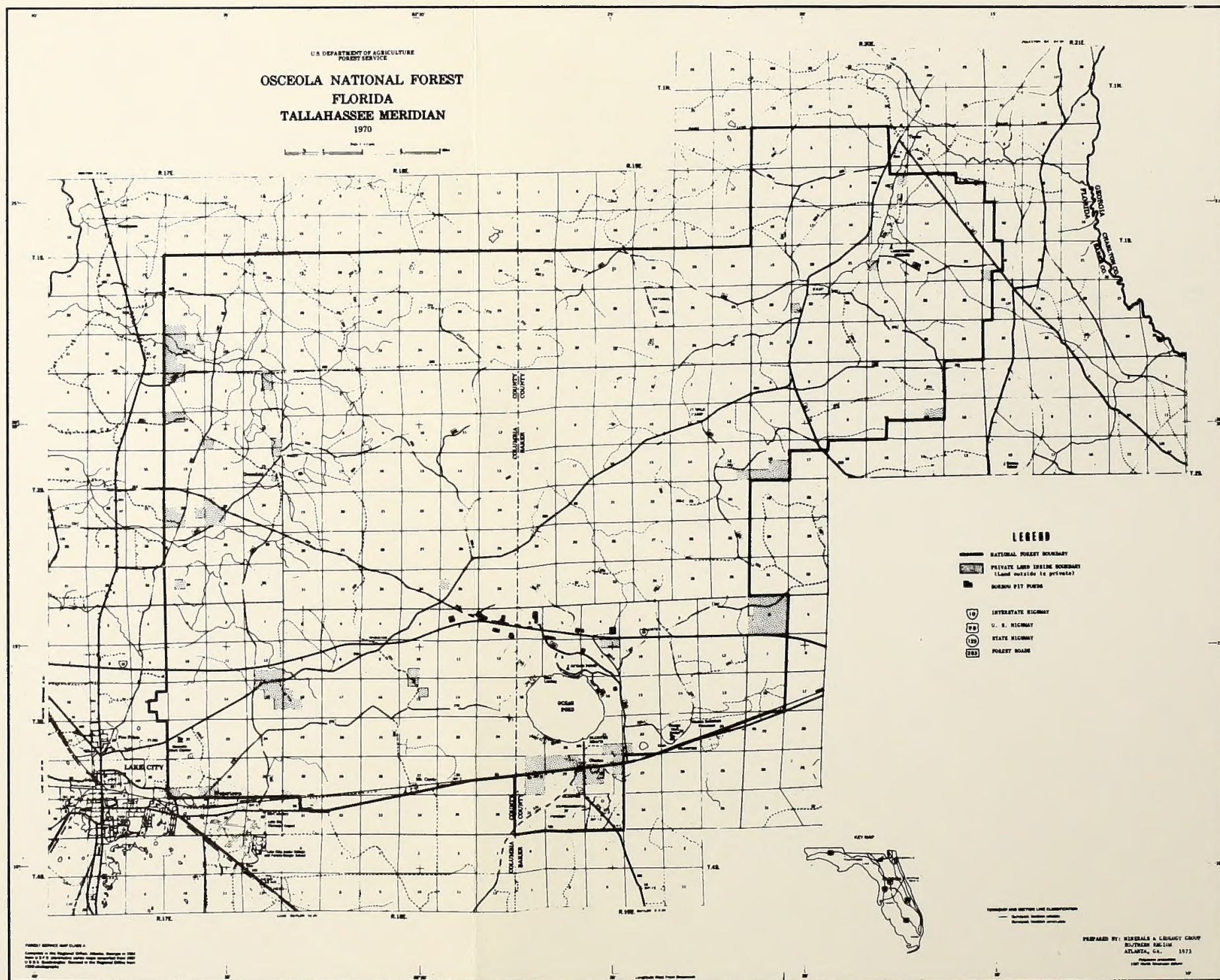
XI MAPS

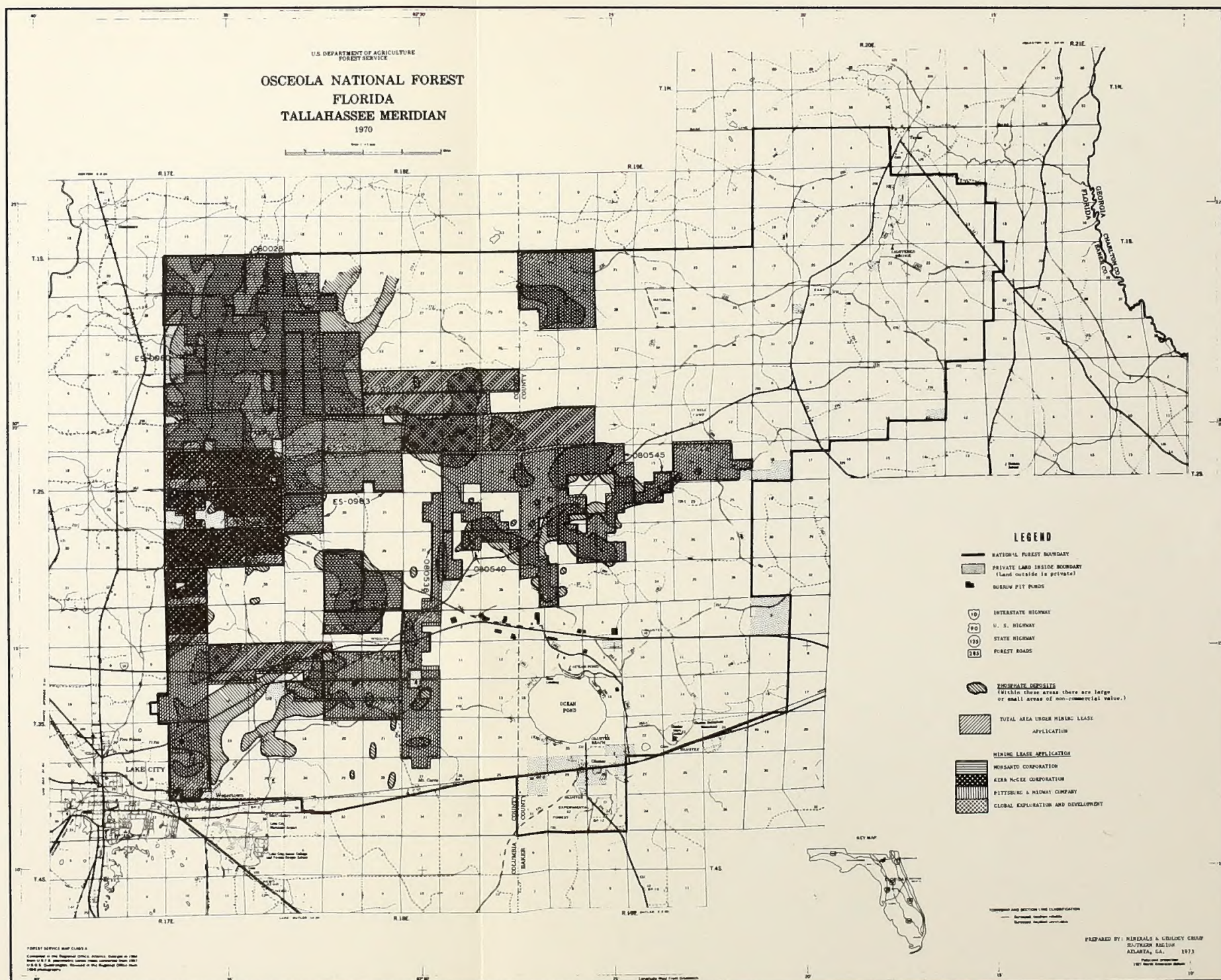
<u>No.</u>		<u>Page</u>
A	Vicinity Map - Osceola National Forest	XI-2
B	Base Map - Osceola National Forest	XI-3
1	Mining Lease Locations	XI-4
2	Known Mineable Phosphate Deposits	XI-5
3	General Soil and Vegetation Associations	XI-6
4	Watershed - with water quality stations	XI-7
5-0	Key to Flood Prone Maps	XI-8
	5-1 Flood Prone Map - Benton Quadrangle	XI-9
	5-2 Flood Prone Map - Fairview Quad- rangle	XI-10
	5-3 Flood Prone Map - Sanderson NW Quad- rangle	XI-11
	5-4 Flood Prone Map - Taylor Quadrangle	XI-12
	5-5 Flood Prone Map - White Springs East Quadrangle	XI-13
	5-6 Flood Prone Map - Deep Creek Quad- rangle	XI-14
	5-7 Flood Prone Map - Big Gum Swamp Quad- rangle	XI-15
	5-8 Flood Prone Map - Sanderson North Quadrangle	XI-16
	5-9 Flood Prone Map - Lake City West Quadrangle	XI-17
	5-10 Flood Prone Map - Lake City East Quadrangle	XI-18
	5-11 Flood Prone Map - Olustee Quadrangle	XI-19
	5-12 Flood Prone Map - Sanderson South Quadrangle	XI-20
6	Watershed - with phosphate deposits, sensi- tive areas, and deep water well locations	XI-21
7	High Sensitive Areas	XI-22
8	Bear Habitat	XI-23



VICINITY MAP

OSCEOLA NATIONAL FOREST
FLORIDA





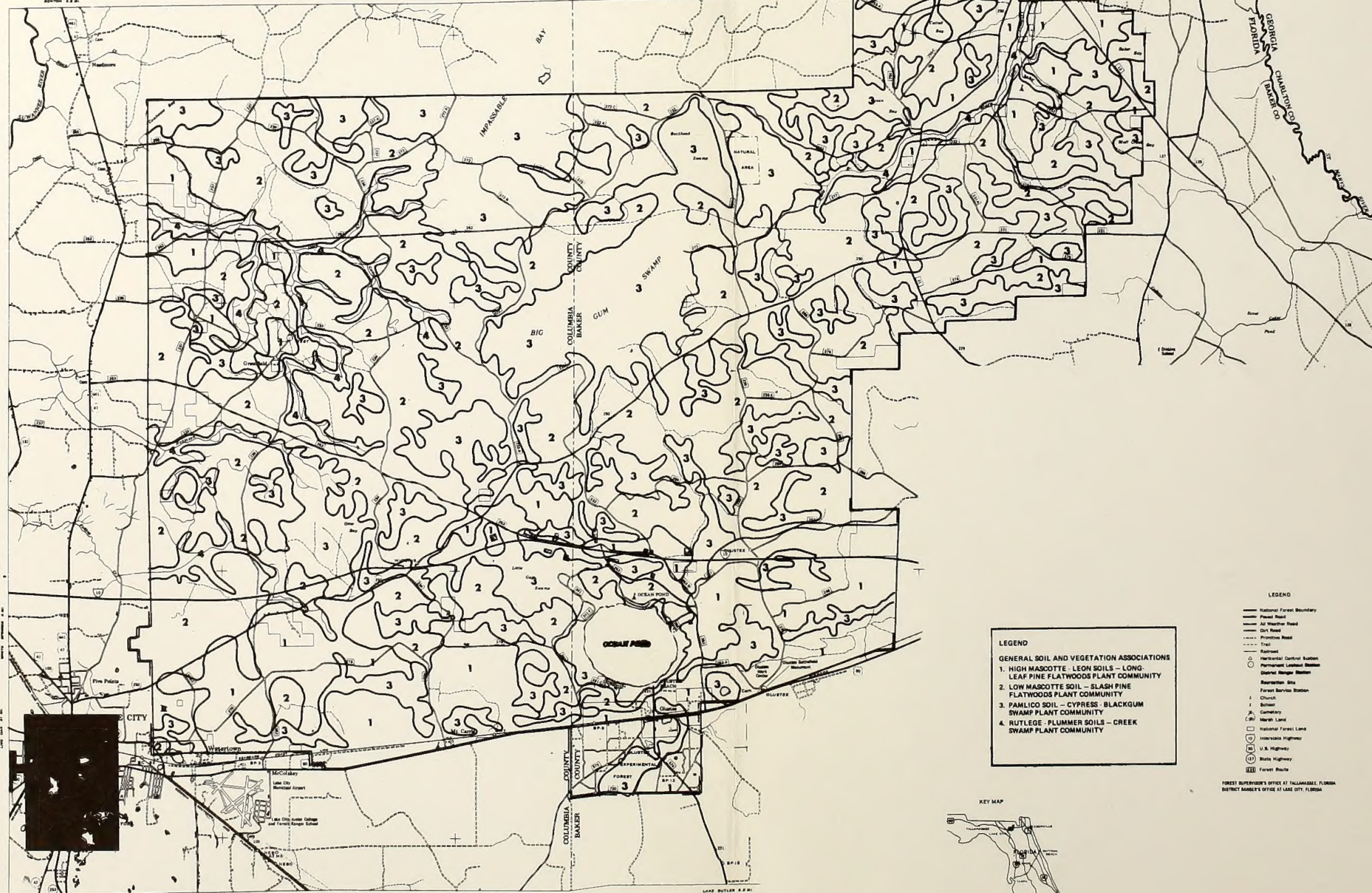
U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

OSCEOLA NATIONAL FOREST

FLORIDA

TALLAHASSEE MERIDIAN

Scale 1" = 1 mile



LEGEND

GENERAL SOIL AND VEGETATION ASSOCIATIONS

1. HIGH MASCOFFE - LEON SOILS - LONG-LEAF PINE FLATWOODS PLANT COMMUNITY
2. LOW MASCOFFE SOIL - SLASH PINE FLATWOODS PLANT COMMUNITY
3. PALMICO SOIL - CYPRESS - BLACKGUM SWAMP PLANT COMMUNITY
4. RUTLEGE - PLUMMER SOILS - CREEK SWAMP PLANT COMMUNITY

LEGEND

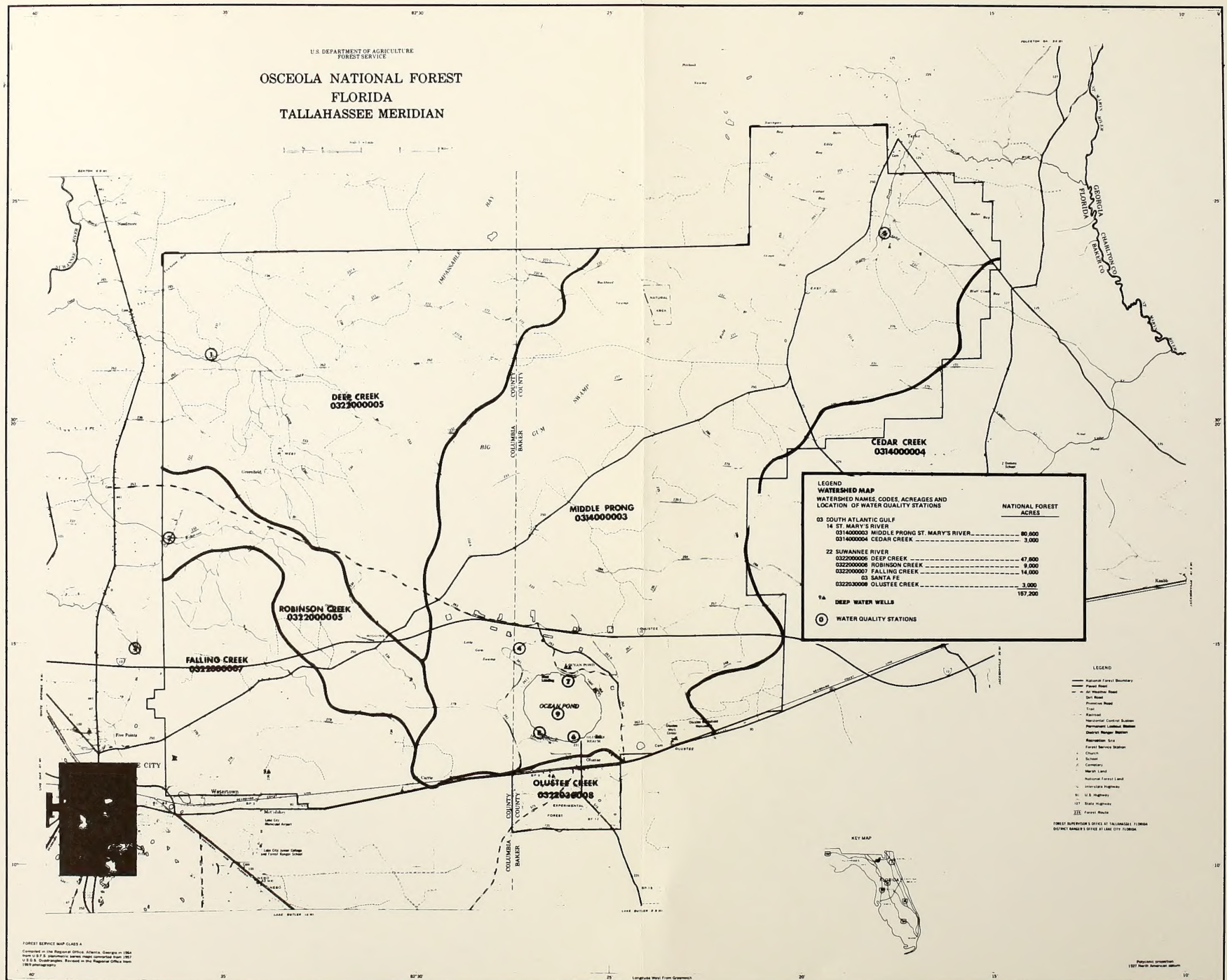
- National Forest Boundary
- Forest Road
- County Road
- State Road
- U.S. Highway
- Interstate Highway
- Trail
- Horizontal Control Station
- Permanent Leveling Station
- Survey Bench Mark
- Recreation Site
- Forest Service Station
- Church
- School
- Cemetery
- Marsh Land
- National Forest Land
- Interstate Highway
- U.S. Highway
- State Highway
- Forest Route



FOREST SERVICE MAP CLASS A
Compiled in the Regional Office, Atlanta, Georgia in 1964
from U.S.F.S. planimetric series maps converted from 1957
U.S.G.S. Overlaid. Revised in the Regional Office from
1965 photography.

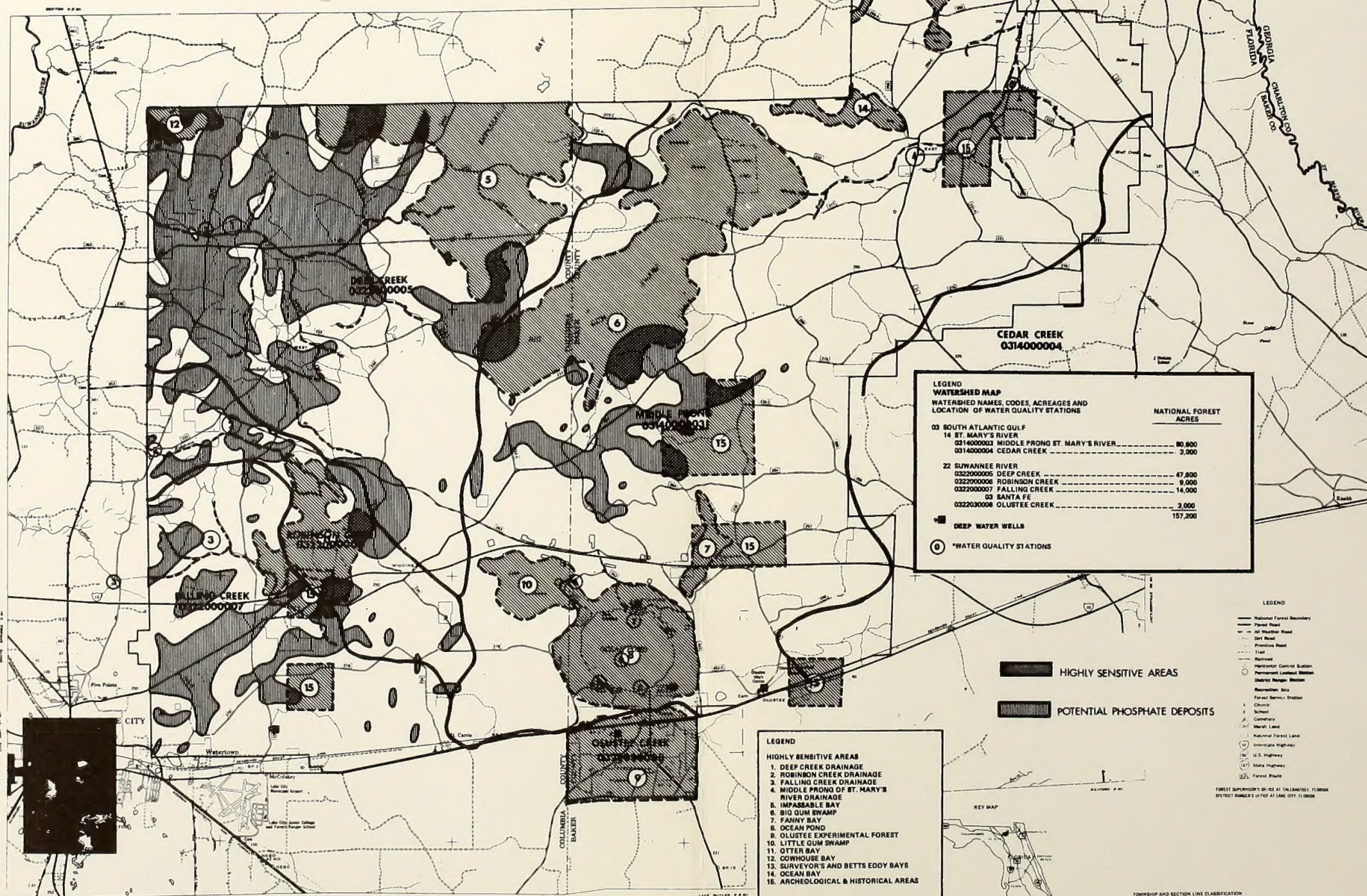
FOREST SUPERVISOR'S OFFICE AT TALLAHASSEE, FLORIDA
DISTRICT MANAGER'S OFFICE AT LAKE CITY, FLORIDA

Projection
1957 North American Datum



U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
EDWARD P. CLIFF, CHIEF
OSCEOLA NATIONAL FOREST
FLORIDA
TALLAHASSEE MERIDIAN

Scale 1:250,000

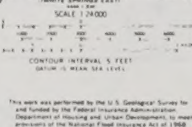


FOREST SERVICE MAP CLASS A
Compiled in the Regional Office, Atlanta, Georgia in 1964 from U.S.F.S. topographic series maps converted from 1957 U.S.G.S. quadrangles. Revised in the Regional Office from 1969 photoreprints.

FOREST SUPERVISORS BY VIC AT TALLAHASSEE, FLORIDA
DISTRICT MANAGER'S OFFICE AT LAKE CITY, FLORIDA

Projection: projection
1927 North American datum

BENTON QUADRANGLE
FLORIDA
7.5 MINUTE SERIES (TOPOGRAPHIC)

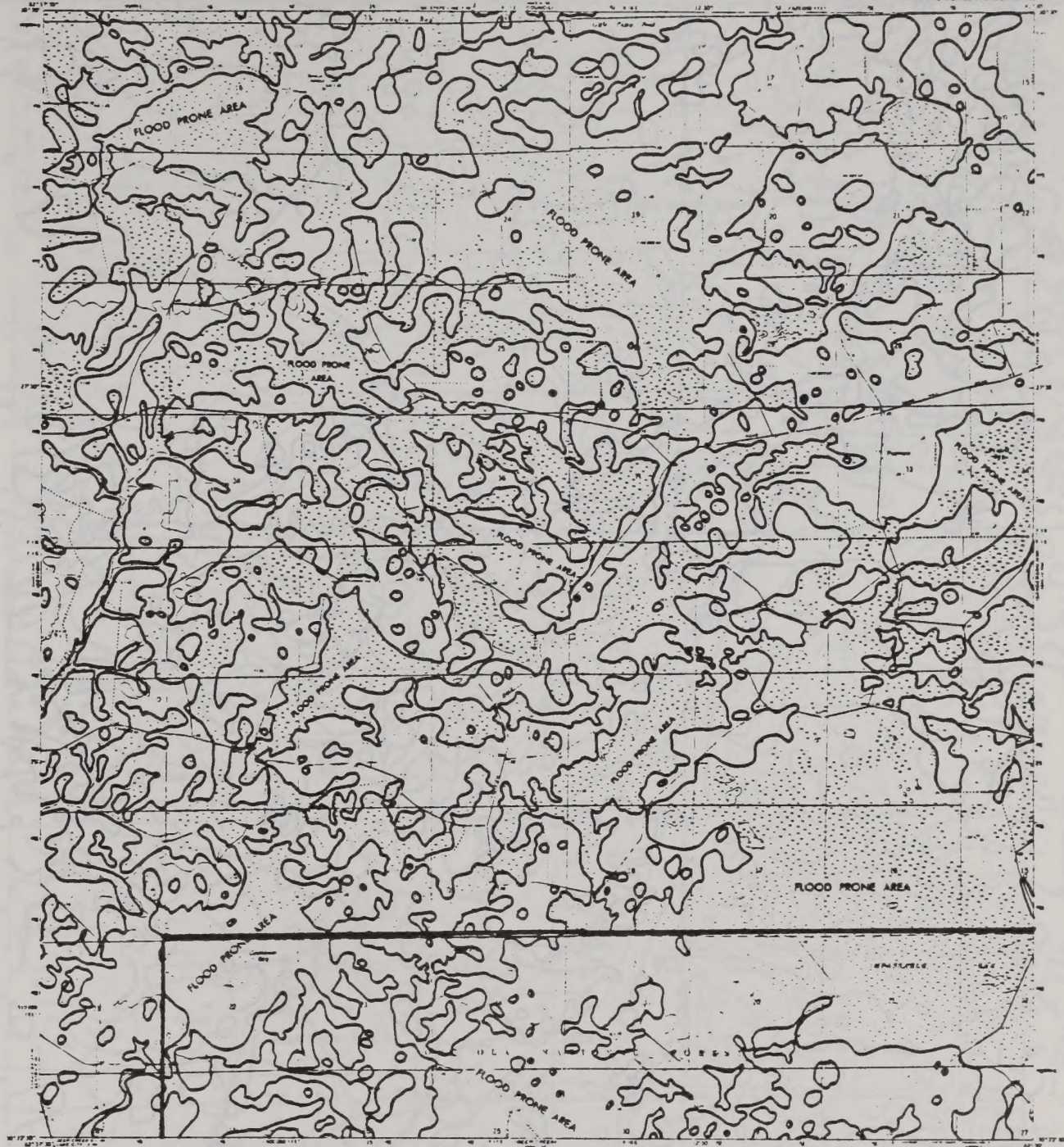


BENTON, FLA.
Bore by U. S. Geological Survey

XI-9

MAP OF FLOOD-PRONE AREAS

FAIRVIEW QUADRANGLE
FLORIDA-COLUMBIA CO
7.5 MINUTE SERIES (TOPOGRAPHIC)



This map is based on the 1:25,000 scale topographic map of the Fairview Quadrangle, Florida-Columbia County, Georgia, published by the U.S. Geological Survey in 1961. The map shows the flood-prone areas as determined by the U.S. Army Corps of Engineers, Vicksburg District, in 1961. The flood-prone areas are shown by a stippled pattern. The map is based on the 1:25,000 scale topographic map of the Fairview Quadrangle, Florida-Columbia County, Georgia, published by the U.S. Geological Survey in 1961. The map shows the flood-prone areas as determined by the U.S. Army Corps of Engineers, Vicksburg District, in 1961. The flood-prone areas are shown by a stippled pattern.

SCALE 1:62,500
1 inch = 1 mile
CONTINUOUS INTERVAL 1:62,500
FAIRVIEW, FLA.

Copyright 1961
U.S. Geological Survey
Reston, Virginia 20192

This map was prepared by the U.S. Geological Survey for the U.S. Army Corps of Engineers, Vicksburg District, in 1961. The map shows the flood-prone areas as determined by the U.S. Army Corps of Engineers, Vicksburg District, in 1961. The flood-prone areas are shown by a stippled pattern.

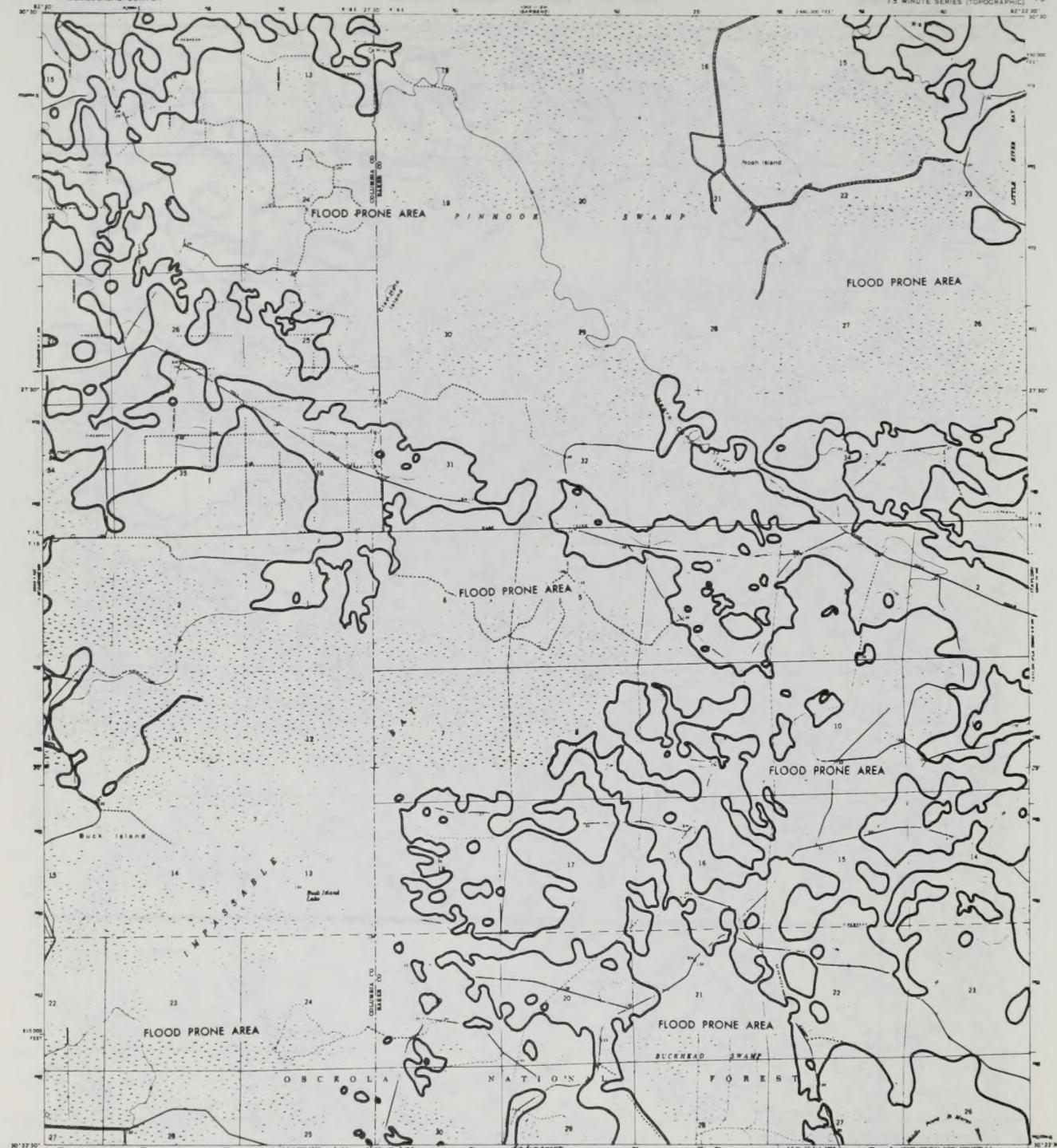
FAIRVIEW, FLA.
Map by U.S. Geological Survey
1961

773

MAP NO. 5-2

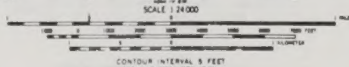
MAP OF FLOOD-PRONE AREAS

SANDERSON NW QUADRANGLE
FLORIDA
15 MINUTE SERIES (TOPOGRAPHIC)



Approximate boundaries of flood-prone areas are shown on this map. There is, in the average, about a 1:1000 chance in 100 that the designated areas will be inundated in any year. This information is important to public agencies and private individuals concerned with future land development. The flood-prone areas have been delineated through use of readily available information on past floods rather than from detailed field surveys and measurements in general. On additional areas on the general conditions and do not take into consideration the possible effects of existing or proposed flood control structures except where these effects could be measured. Flood areas have been identified for (1) areas where the maximum drainage basin exceeds 100 square miles, (2) flood areas in flood regions where the maximum drainage basin exceeds 100 square miles, (3) flood areas in coastal regions where the maximum drainage basin exceeds 100 square miles, and (4) existing drainage basins, according to topographic and practical use of the flood plain.

The 1910 Census, in Florida Division 443, recommended the protection of flood-prone areas in order to maintaining flood losses by quickly identifying the areas of potential flood hazards. These detailed flood information may be required for other purposes such as structural design, economic studies, or determination of land-use regulations. Such detailed information may be obtained from the U.S. Geological Survey, other Federal agencies, or State, local, and private agencies.

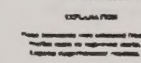


This work was performed by the U.S. Geological Survey for and funded by the Federal Insurance Administration, Department of Housing and Urban Development, in cooperation of the National Flood Insurance Act of 1968.

EXPLANATION
Flood boundaries were estimated from profiles based on high-water marks. Regional stage-frequency relations.

SANDERSON NW, FLA.
Based on U.S. Geological Survey
1968

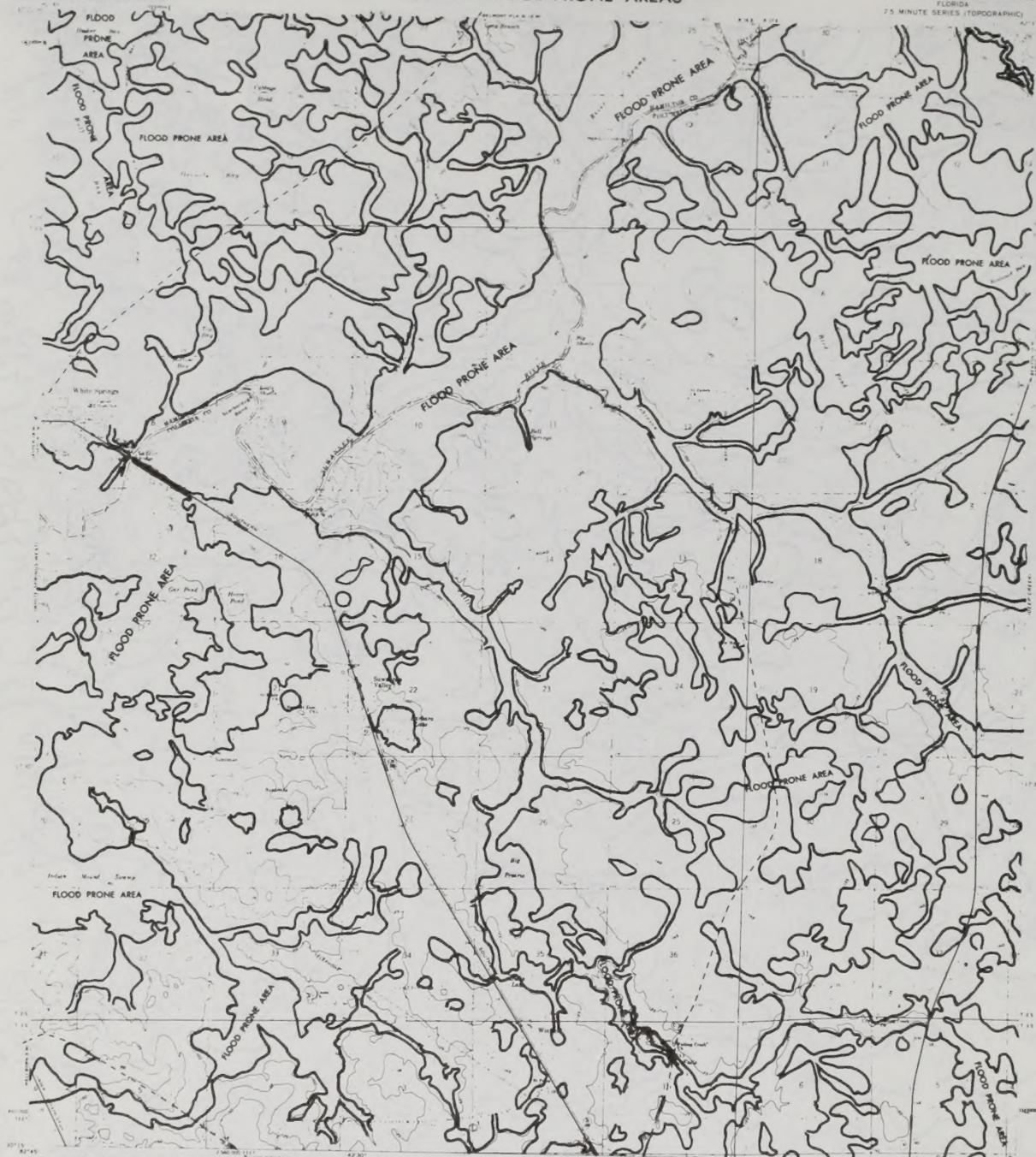
MAP NO. 5-3



TAYLOR FLA.
State of Fla. - 3rd Congressional District

MAP OF FLOOD-PRONE AREAS

WHITE SPRINGS EAST QUADRANGLE
FLORIDA
7.5 MINUTE SERIES (TOPOGRAPHIC)



The purpose of the flood-prone area map is to show to administrators, planners, and engineers concerned with future land development those areas that are subject to flooding. The U. S. Geological Survey was requested by the FWS Commission to prepare these maps as required in House Document 466. The flood-prone areas have been delineated by the Geological Survey on the basis of readily available information.

Flood-prone areas were delineated for those areas that meet the following criteria:

- (1) Urban areas where the upstream drainage area exceeds 50 square miles, (2) rural areas in flood regions where the upstream drainage area exceeds 100 square miles, and (3) rural areas in flood regions where the upstream drainage area exceeds 500 square miles.

The flood-prone areas shown on this map have a 1 in 100 chance of being inundated during any year. Flood areas have been delineated without consideration of present or future flood-control projects that may reduce flood levels.

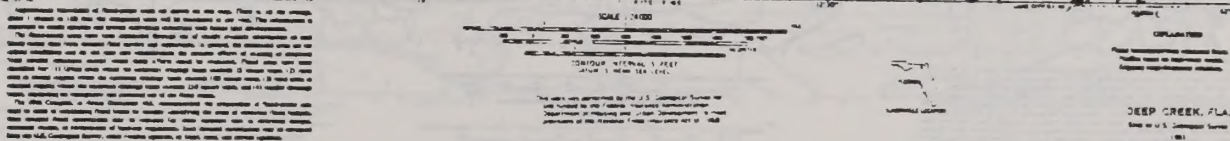
Flood hazard reports provide the detailed flood information that is needed for economic studies, for formulating zoning regulations, and for setting design criteria to increase future flood losses. When detailed information, such as that contained in the flood hazard reports, is required, contact the U. S. Army Corps of Engineers, the U. S. Geological Survey, or the Tennessee Valley Authority in the areas of their jurisdiction.

SCALE 1:24,000
1 INCH = 2,000 FEET
1:24,000
CONTOUR INTERVAL 5 FEET
ELEVATION 1000 FEET

EXPLANATION
Flood boundaries were estimated from
profiles based on high water marks
Regional stage-frequency relations
Photomaps

WHITE SPRINGS EAST, FLA.
Base to U. S. Geological Survey

MAP NO. 5-5



XI-14

MAP OF FLOOD-PRONE AREAS

BIG OUM SWAMP QUADRANGLE
FLORIDA
7.5 MINUTE SERIES (TOPOGRAPHIC)



Approximate boundaries of flood-prone areas are shown on this map. There is no assurance, however, that the designated areas will be inundated in any year. This information is important to public agencies and private individuals concerned with future land development. The flood-prone areas have been delineated through use of readily available information on past flood conditions and do not take into consideration the possible effects of existing or proposed flood control structures or other measures which might be employed. Flood prone areas are shown on this map where the elevation drainage basin exceeds 100 square miles, (1) flood prone areas in flood regions where the elevation drainage basin exceeds 100 square miles, (2) flood prone areas in flood regions where the elevation drainage basin exceeds 100 square miles, and (3) flood prone areas depending on topography and present use of the flood plain.

The 98th Congress, in House Document 941, recommended the preparation of flood-prone maps to assist in maintaining flood insurance to quickly identify the areas of potential flood hazards. These flood-prone maps are intended to be used by public agencies and private individuals in planning, economic studies, or for insurance purposes. Such flood-prone information may be obtained from the U.S. Geological Survey, other Federal agencies, or State, local, and private agencies.

Prepared by the U.S. Department of the Interior,
Geological Survey, in cooperation with the
U.S. Department of Housing and Urban Development,
Federal Insurance Administration.

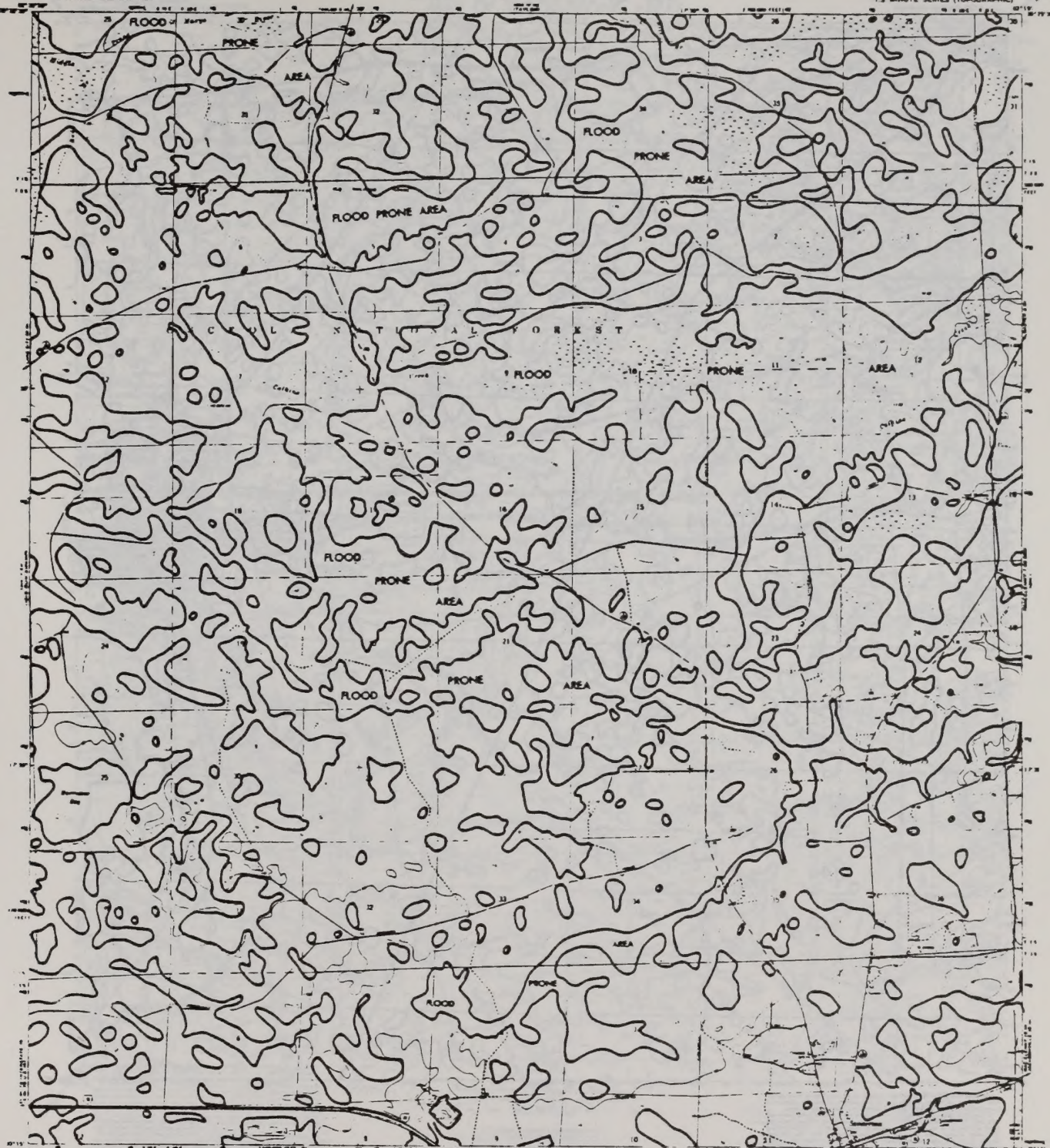
1974

MAP NO. 5-7

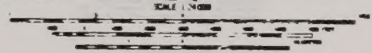
BIO OUM SWAMP, FLA.
Scale in U.S. Geological Survey
1968

MAP OF FLOOD-PRONE AREAS

SANDERSON NORTH QUADRANGLE
FLORIDA - BAKER CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



Topographic map of Sanderson North Quadrangle, Florida, Baker County, showing flood-prone areas. The map is a 7.5-minute series topographic map. The flood-prone areas are indicated by thick black lines and labels. The map includes a grid and contour lines. The central area is labeled 'CULMINANT NATURAL FOREST'. The map is oriented with North at the top.



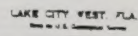
CONTOUR INTERVAL, 5 FEET
ELEVATION IN FEET



EXPLANATION
Thick black line indicates flood-prone area
Thin black line indicates boundary of flood-prone area

SANDERSON NORTH, FLA.
Sheet No. 5 of 5 Contour Series

MAP NO. 5-8



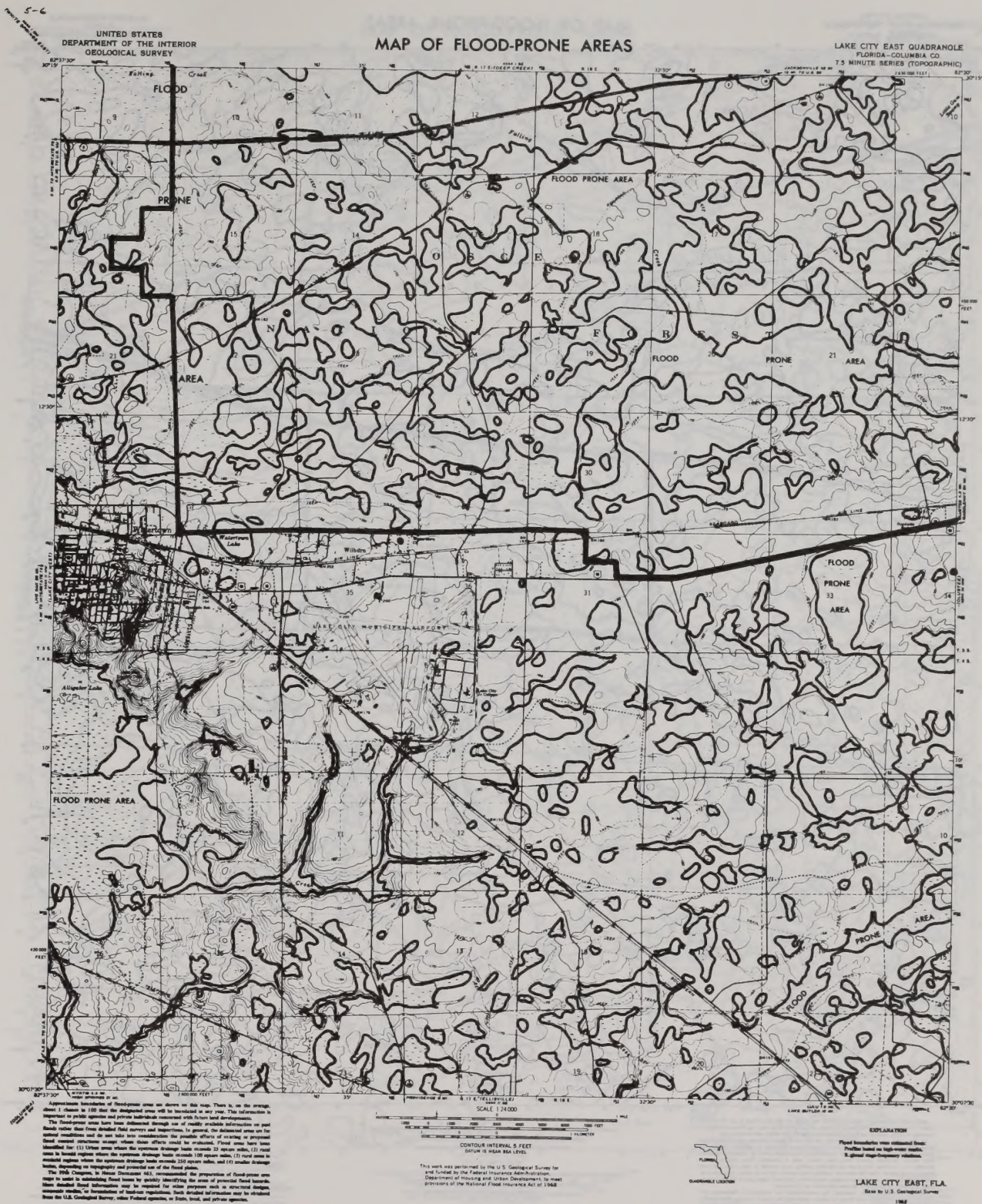
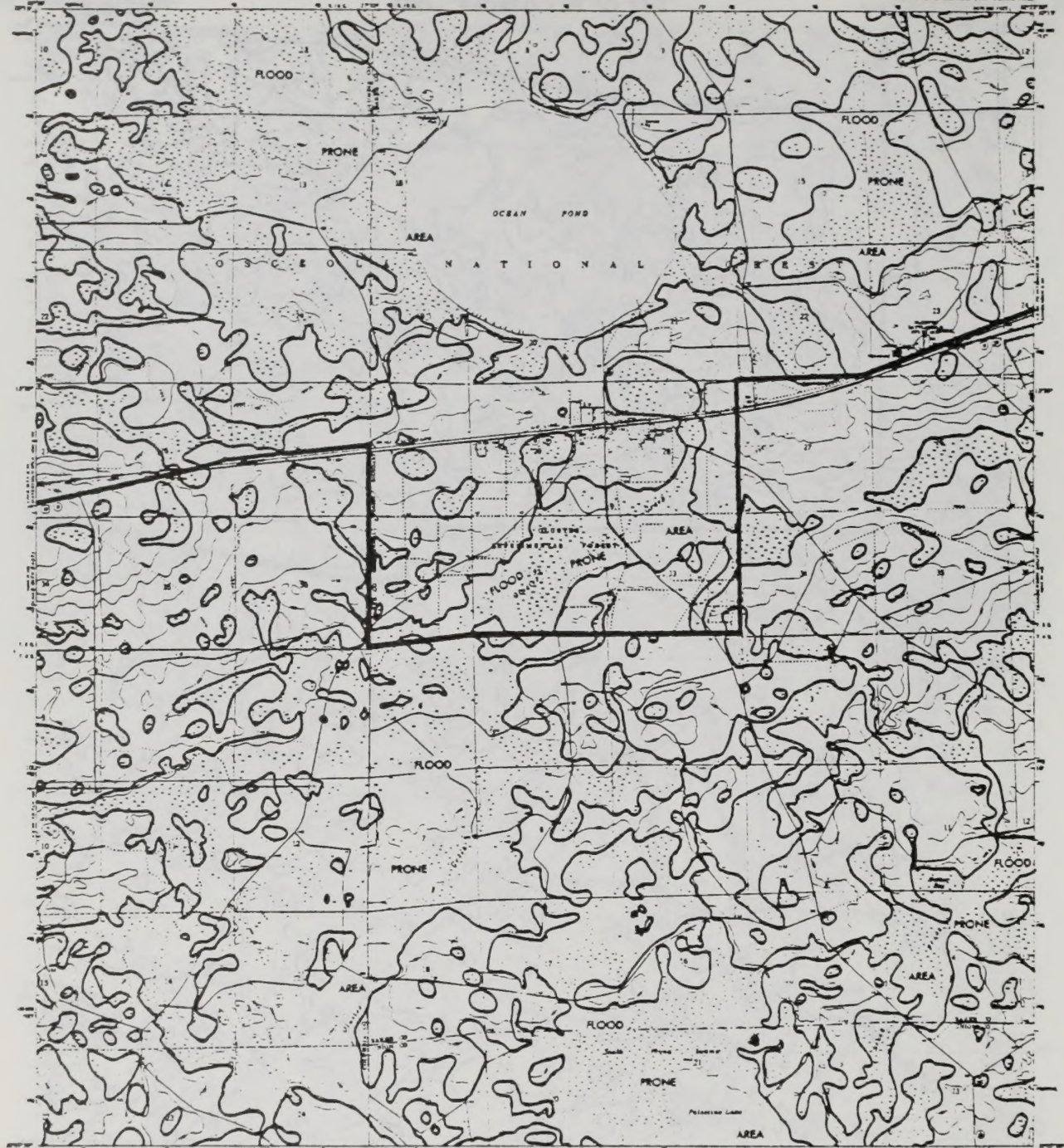


FIGURE NO. 5-10

MAP OF FLOOD-PRONE AREAS

OLIVETTE QUADRANGLE
FLORIDA
7.5 MINUTE SERIES (TOPOGRAPHIC)



Informational statement of flood-prone areas for the State of Florida is an act of the State of Florida, Chapter 100, Section 100.01, Florida Statutes, which requires the Department of Natural Resources to prepare and publish a map of flood-prone areas for the State of Florida. The Department of Natural Resources has prepared this map of flood-prone areas for the State of Florida. The map is based on the best available information and is not a guarantee of accuracy. The map is for informational purposes only and should not be used for any other purpose. The map is subject to change without notice. The map is published by the Department of Natural Resources, State of Florida, and is available for purchase from the Department of Natural Resources, State of Florida. The map is published by the Department of Natural Resources, State of Florida, and is available for purchase from the Department of Natural Resources, State of Florida.

SCALE 1:2500
SECTIONAL INTERVAL 1:1000
SECTION 1:1000

The map was prepared by the U.S. Geological Survey for the State of Florida. The map is based on the best available information and is not a guarantee of accuracy. The map is for informational purposes only and should not be used for any other purpose. The map is subject to change without notice. The map is published by the Department of Natural Resources, State of Florida, and is available for purchase from the Department of Natural Resources, State of Florida.



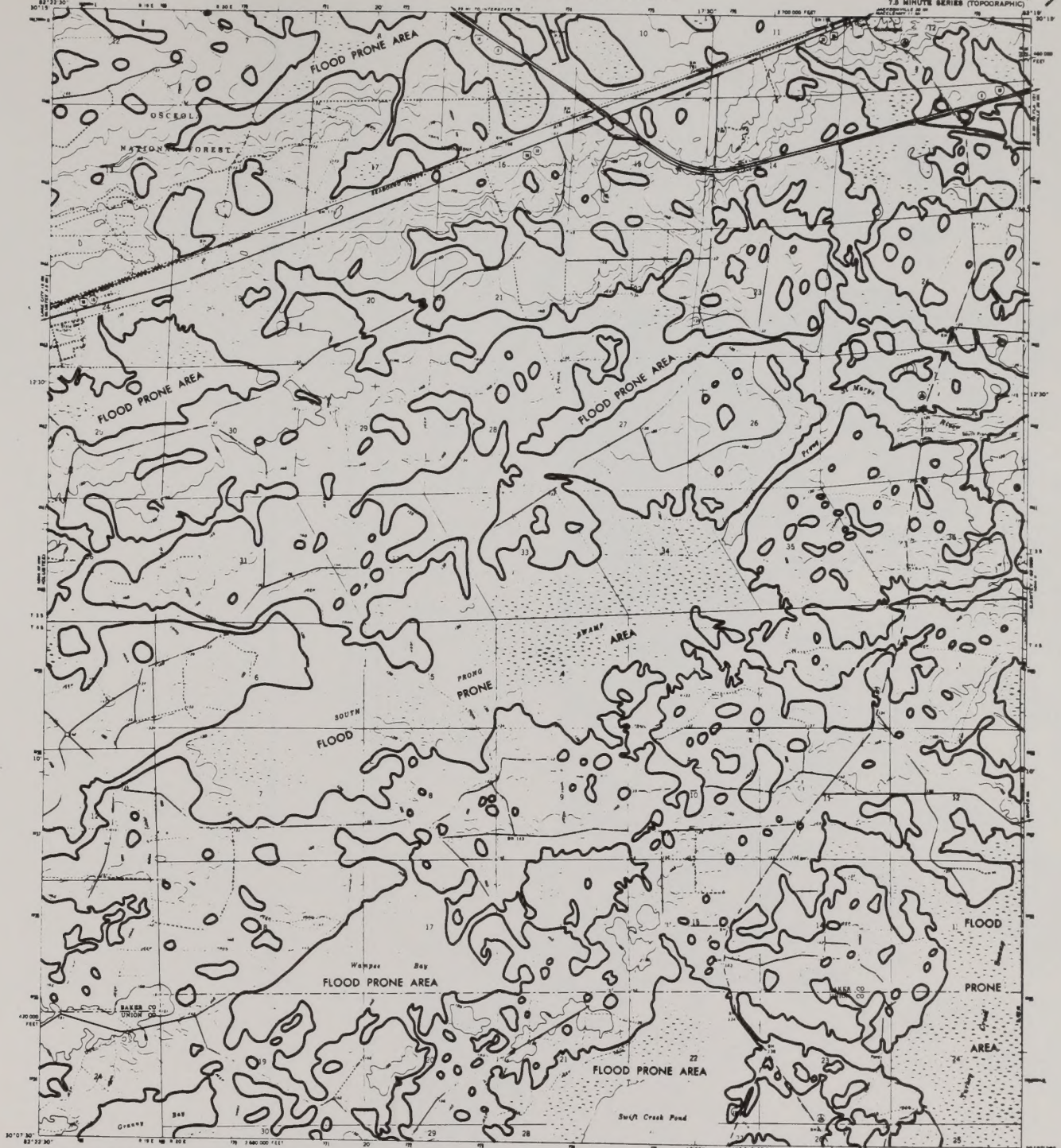
EXPLANATION
Flood-prone areas indicated by
shaded areas on topographic maps.
National Flood Insurance Program

OLIVETTE, FLA.
Map No. 5-11
1968

MAP NO. 5-11

MAP OF FLOOD-PRONE AREAS

SANDERSON SOUTH QUADRANGLE
FLORIDA
7.5 MINUTE SERIES (TOPOGRAPHIC)
CONT'D 11 2



Approximate boundaries of flood-prone areas are shown on this map. There is, on the average, about 1 chance in 100 that the designated areas will be inundated in any year. This information is important to public agencies and private individuals concerned with flood and drainage problems.

The flood-prone areas have been delineated through use of readily available information on past floods rather than from detailed field surveys and inspections. In general, the delineated areas are the natural conditions and do not take into consideration the possible effects of existing or proposed flood control structures except where these effects could be evaluated. Flood areas have been identified for: (1) alluvial areas where the maximum drainage basin exceeds 25 square miles; (2) road areas in hard regions where the maximum drainage basin exceeds 100 square miles; (3) road areas in alluvial regions where the maximum drainage basin exceeds 100 square miles; and (4) smaller drainage basins, depending on topography and potential use of the flood plain.

The 9th Congress, in House Document 1485, recommended the preparation of flood-prone area maps to assist in measuring flood losses by quickly identifying the areas of potential flood hazards. More detailed flood information may be required for other purposes such as structural design, economic studies, or formulation of land-use regulations. Such detailed information may be obtained from the U.S. Geological Survey, other Federal agencies, or State, local, and private agencies.

SCALE 1:24,000
CONT'D INTERVAL 5 FEET
SWAMP & WETLAND LEVELS

EXPLANATION
Flood boundaries were estimated from
profiles based on high-water marks.
Flooded topography indicated.

This work was performed by the U.S. Geological Survey for
and funded by the Federal Insurance Administration,
Department of Housing and Urban Development, in meet-
ing provisions of the National Flood Insurance Act of 1968

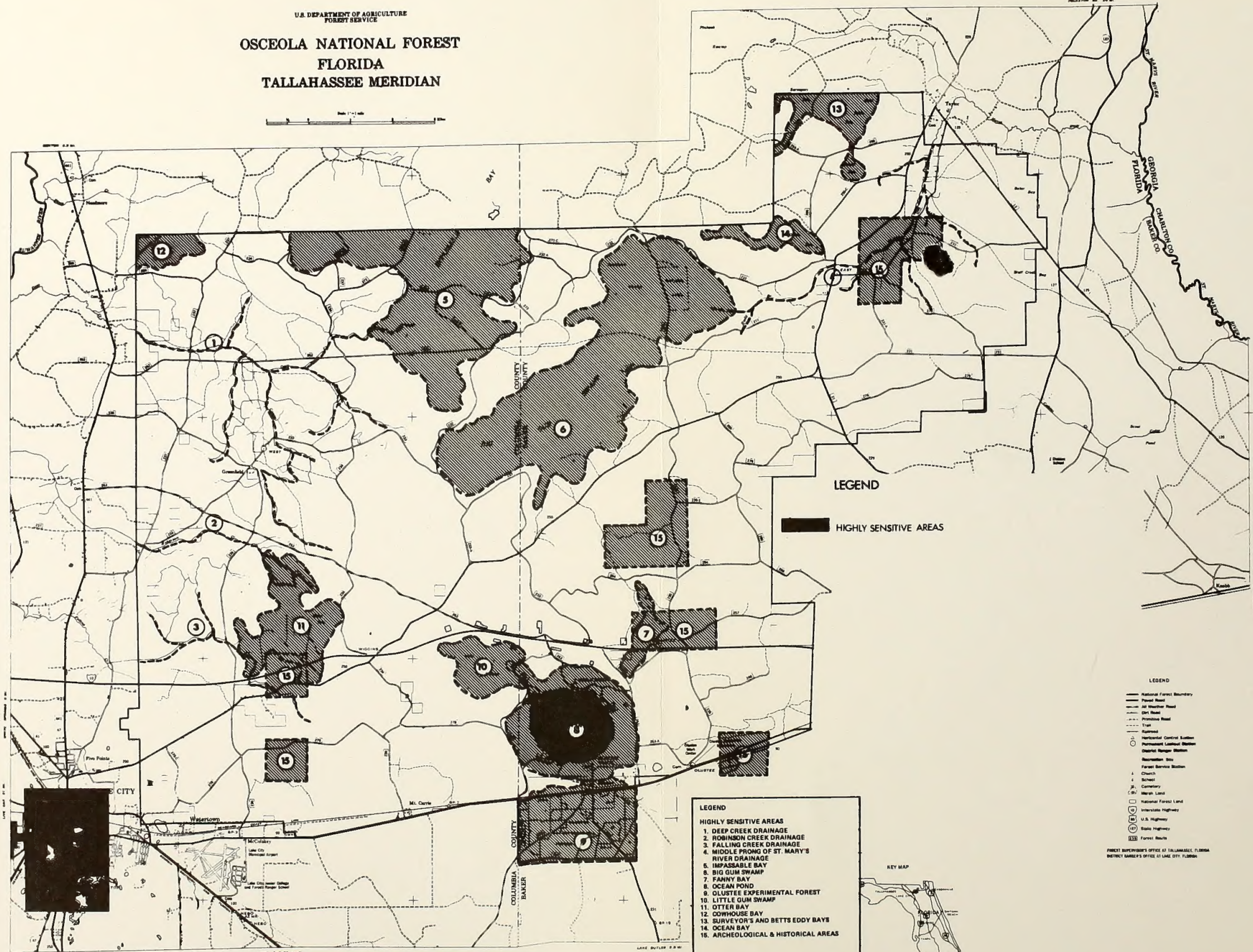
SANDERSON SOUTH, FLA.
Base by U.S. Geological Survey
1963

1974

MAP NO. 5-12

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
OSCEOLA NATIONAL FOREST
FLORIDA
TALLAHASSEE MERIDIAN

Scale 1" = 1 mile



LEGEND

HIGHLY SENSITIVE AREAS

- LEGEND**
- HIGHLY SENSITIVE AREAS**
1. DEEP CREEK DRAINAGE
 2. ROBINSON CREEK DRAINAGE
 3. FALLING CREEK DRAINAGE
 4. MIDDLE PRONG OF ST. MARY'S RIVER DRAINAGE
 5. IMPASSABLE BAY
 6. BIG GUM SWAMP
 7. FANNY BAY
 8. OCEAN POND
 9. OLUSTEE EXPERIMENTAL FOREST
 10. LITTLE GUM SWAMP
 11. OTTER BAY
 12. COWHOUSE BAY
 13. SURVEYOR'S AND BETTS EDDY BAYS
 14. OCEAN BAY
 15. ARCHEOLOGICAL & HISTORICAL AREAS

LEGEND

- National Forest Boundary
- Forest Road
- All Weather Road
- Dirt Road
- Primitive Road
- Trail
- Railroad
- Vertical Control Station
- Permanent Leveling Station
- District Ranger Station
- Recreation Site
- Forest Service Station
- Church
- School
- Cemetery
- Marsh Land
- National Forest Land
- Interstate Highway
- U.S. Highway
- State Highway
- Forest Route

FOREST SUPERVISOR'S OFFICE AT TALLAHASSEE, FLORIDA
DISTRICT RANGER'S OFFICE AT LAKE CITY, FLORIDA

KEY MAP

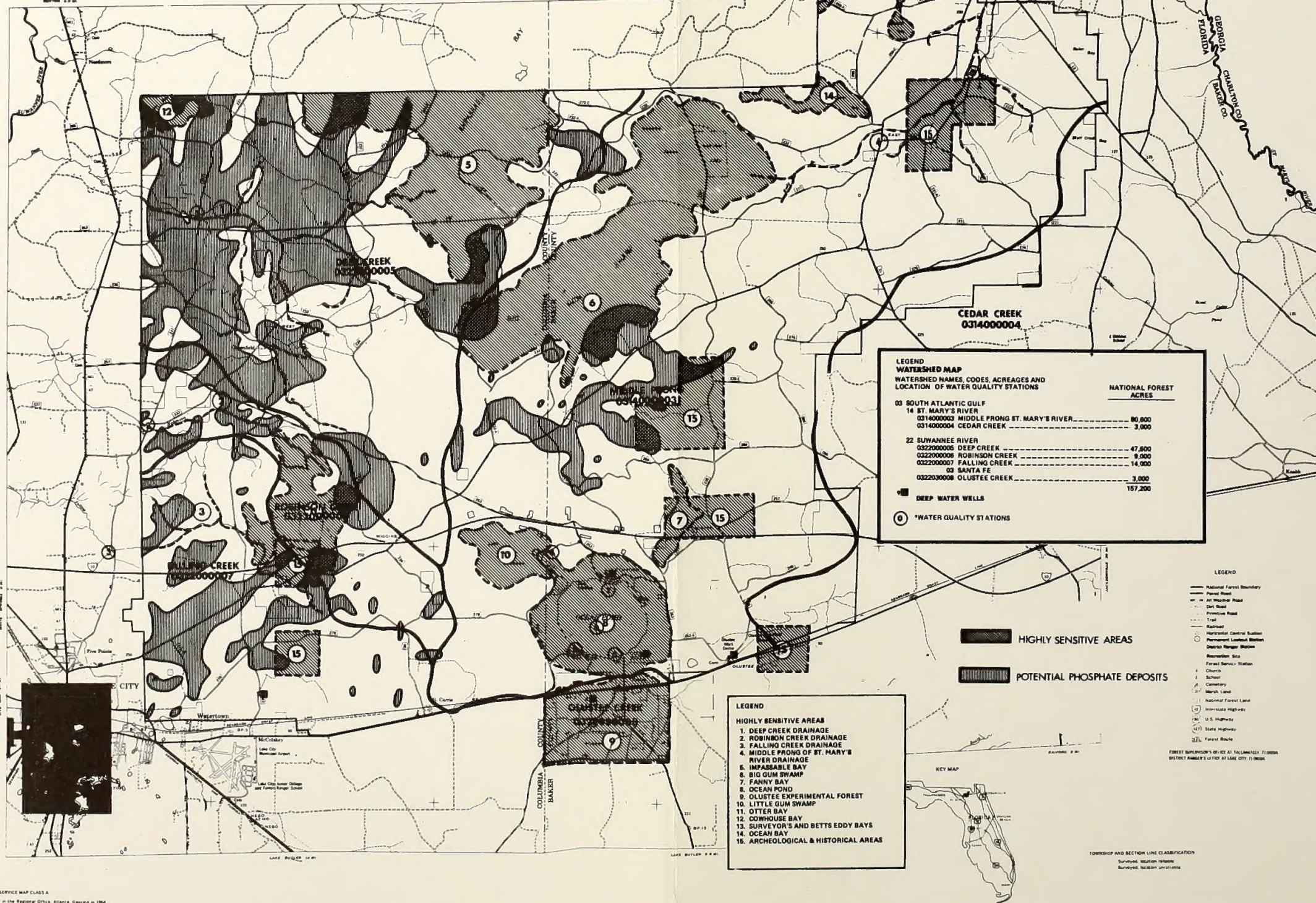


FOREST SERVICE MAP CLASS A
Compiled in the Regional Office, Atlanta, Georgia in 1964
from U.S.F.S. planimetric series maps converted from 1957
U.S.G.S. Overlays. Revised in the Regional Office from
1965 photography.

Photocopy projection
1967 North American Datum

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
EDWARD P. CLIFF, CHIEF
OSCEOLA NATIONAL FOREST
FLORIDA
TALLAHASSEE MERIDIAN

Scale 1" = 1 mile



U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

OSCEOLA NATIONAL FOREST








FLORIDA

TALLAHASSEE MERIDIAN

Scale 1" = 1 mile

 BEAR HABITAT

LEGEND

-  National Forest Boundary
-  Paved Road
-  All Weather Road
-  Dirt Road
-  Promissory Road
-  Trail
-  Railroad
-  Aerial Control Station
-  Permanent Lookout Station
-  District Ranger Station
-  Recreation Site
-  Forest Service Station
-  Church
-  School
-  Cemetery
-  Marsh Land
-  National Forest Land
-  Interstate Highway
-  U.S. Highway
-  State Highway
-  Forest Road

FOREST SUPERVISOR'S OFFICE AT TALLAHASSEE, FLORIDA
DISTRICT RANGER'S OFFICE AT LAKE CITY, FLORIDA

KEY MAP



FOREST SERVICE MAP CLUES A
Compiled in the Regional Office, Atlanta, Georgia in 1964
from U.S.F.S. planimetric series maps (reprinted from 1957
U.S.F.S. Quadangles). Revised in the Regional Office from
1965 photography.

Publication 1967 North American Datum

XII APPENDICES

<u>No.</u>	<u>Page</u>
1. U.S. Geological Survey - Streamflow Station Summaries	XII-2
2. U.S. Geological Survey - Stage Data for Alligator Lake (Lake City, Florida)	XII-7
3. State of Florida Rules - Pollution of Waters	XII-9
4. State of Florida Rules - Air Pollution	XII-17
5. State of Florida - Rare Plant Law	XII-28
6. U.S. Forest Service - List of Vertebrates on the Osceola National Forest	XII-32
7. Socio-Economic Data by Counties	XII-36
8. U.S. Forest Service-List of Common Plant Species on the Osceola National Forest	XII-51
9. State of Florida Rules - Requirements for Earthen Dams, Phosphate Mining and Processing Operations	XII-56
10. U.S. Department of the Interior - Surface Exploration, Mining and Reclamation of Lands (Part 23, Title 43 C.F.R.)	XII-62
11. U.S. Forest Service - Prospecting Permit	XII-70
12. U.S. Forest Service - Special Stipulations for Prospecting Permit	XII-73
13. U.S. Department of the Interior (BLM) - Phosphate Prospecting Permit (3160-2)	XII-75
14. U.S. Department of the Interior (BLM) - Phosphate Lease Form (3160-1)	XII-80
15. U.S. Department of the Interior (BLM) - Stipulation for Lands Under Jurisdiction of Department of Agriculture	XII-85
16. U.S. Department of the Interior (G.S.) - Operating Regulations for Exploration, Development and Production (Part 231, Title 30 C.F.R.)	XII-88
17. Table of prevailing wind directions	XII-95
18. Proposed Legislation	XII-102

APPENDIX 1

U.S. Geological Survey

Streamflow Station Summaries

GAGING STATION RECORDS

09C ST. MARYS RIVER BASIN AND COASTAL AREA

17

02228500 North Prong St. Marys River at Moniac, Ga.

LOCATION.--Lat 30°31'03", long 82°13'50", in NW quarter sec.8, T.1 N., R.21 E., Baker County, Fla., near right bank at upstream side of bridge on State Highways 2 and 94, 0.2 mile upstream from Georgia Southern & Florida Railway bridge, 0.4 mile west of Moniac, 1.0 mile downstream from Moccasin Creek, and 122 miles upstream from mouth of St. Marys River.

DRAINAGE AREA.--160 sq mi, approximately, includes part of watershed in Okefenokee Swamp which is indeterminate.

PERIOD OF RECORD.--January 1921 to December 1923 (published as St. Marys River at Moniac), January 1927 to June 1930, July 1932 to June 1934, October 1950 to current year.

GAGE.--Water-stage recorder. Datum of gage is 89.40 ft above mean sea level. January 1921 to June 1934, nonrecording gage at site 800 ft downstream at datum 3.22 ft higher.

AVERAGE DISCHARGE.--26 years (1921-23, 1927-29, 1932-33, 1950-71), 153 cfs (12.99 inches per year).

EXTREMES.--Current year: Maximum discharge, 1,770 cfs Aug. 17 (gage height, 13.49 ft); minimum, 0.75 cfs June 8 (gage height, 4.40 ft).

Period of record: Maximum discharge, about 6,060 cfs, probably Sept. 19, 1928 (gage height, 19.9 ft, present datum, at site then in use), from rating curve extended above 3,700 cfs; no flow for many days in some years; minimum gage height, 3.62 ft June 26, 1955.

REMARKS.--Records fair.

REVISIONS.--WSP 1234: Drainage area.

WATER TEMPERATURE (°C).--Oct. 1 (1445) 20.5°; Nov. 5 (1330) 14.0°; Dec. 17 (1430) 15.0°; Feb. 10 (1415) 8.5°; Mar. 30 (1625) 17.0°; May 21 (1415) 24.5°; July 9 (1150) 25.0°; Aug. 30 (1220) 27.5°.

18

09C ST. MARYS RIVER BASIN AND COASTAL AREA

02230500 South Prong St. Marys River at Glen St. Mary, Fla.

LOCATION.--Lat 30°16'43", long 82°08'40", in SW quarter sec.31, T.2 S., R.22 E., Baker County, on right bank 65 ft upstream from bridge on U.S. Highway 90, 1.0 mile east of Glen St. Mary, and 8.2 miles upstream from mouth.

DRAINAGE AREA.--130 sq mi, approximately.

PERIOD OF RECORD.--January 1950 to September 1971 (discontinued).

GAGE.--Water-stage recorder. Datum of gage is 77.13 ft above mean sea level.

AVERAGE DISCHARGE.--21 years, 154 cfs (16.09 inches per year).

EXTREMES.--Current year: Maximum discharge, 1,510 cfs Aug. 19 (gage height, 9.13 ft); minimum, 3.2 cfs May 24-26, June 6, 7, 10 (gage height, 1.62 ft).

Period of record: Maximum discharge, 7,510 cfs Sept. 12, 1964 (gage height, 14.23 ft); minimum, 0.40 cfs May 23, 1950 (gage height, 1.52 ft).

REMARKS.--Records good.

REVISIONS (WATER YEARS).--WSP 1905: 1950(M), drainage area.

WATER TEMPERATURE (°C).--Nov. 5 (1455) 15.5°; Dec. 17 (1550) 16.5°; Feb. 11 (1200) 8.5°; Apr. 1 (1400) 15.0°; May 20 (1035) 22.0°; July 20 (1415) 25.5°; Aug. 30 (1515) 25.5°.

09C ST. MARYS RIVER BASIN AND COASTAL AREA

19

02231000 St. Marys River near Macclenny, Fla.

LOCATION.--Lat 30°21'31", long 82°04'54", in NW quarter sec.2, T.2 S., R.22 E., Baker County, on right bank 200 ft downstream from site of former Stokes Bridge, 1 mile downstream from confluence of North and South Prongs, 6 miles northeast of Macclenny, and 100 miles upstream from mouth.

DRAINAGE AREA.--700 sq mi, approximately, includes part of watershed in Okefenokee Swamp which is indeterminate.

PERIOD OF RECORD.--October 1926 to current year.

GAGE.--Water-stage recorder. Datum of gage is 40.00 ft above mean sea level (levels by Mees and Mees). Prior to Feb. 21, 1939, nonrecording gage and Feb. 21, 1939, to Aug. 15, 1948, water-stage recorder, at site of former bridge 200 ft upstream at same datum.

AVERAGE DISCHARGE.--45 years, 677 cfs (13.13 inches per year).

EXTREMES.--Current year: Maximum discharge, 6,240 cfs Aug. 20 (gage height, 15.96 ft); minimum, 27 cfs June 8-10; minimum gage height, 1.02 ft June 9, 10.

Period of record: Maximum discharge, 28,100 cfs Sept. 25, 1947; maximum gage height, 23.25 ft Sept. 13, 1964 (from floodmark); minimum discharge observed, 12 cfs May 22, 1932; minimum gage height observed, 0.04 ft June 4, 5, 1927.

REMARKS.--Records fair.

REVISIONS (WATER YEARS).--WSP 1082: 1928(M), 1945(M). WSP 1142: 1928, 1945. WSP 1434: 1927. WSP 1905: Drainage area.

WATER TEMPERATURE (°C).--Oct. 2 (1155) 22.0°; Nov. 6 (0925) 16.5°; Dec. 18 (0925) 14.0°; Feb. 10 (1655) 12.0°; Apr. 1 (1140) 16.5°; May 20 (1230) 28.0°; July 9 (1415) 25.5°; Sept. 2 (1105) 26.0°.

09C ST. MARYS RIVER BASIN AND COASTAL AREA

2-2300. Turkey Creek at Macclenny, Fla.

LOCATION.--Lat 30°16'08", long 82°07'21", in NE¼ sec.5, T.3 S., R.22 E., Baker County, near left bank at downstream side of bridge on State Highway 121, 0.9 mile south of Macclenny and 1.8 miles upstream from mouth.

DRAINAGE AREA.--20.9 sq mi.

PERIOD OF RECORD.--September 1955 to September 1969 (discontinued as a continuous-record station; converted to a crest-stage partial-record station).

GAGE.--Water-stage recorder. Datum of gage is 99.95 ft above mean sea level (Florida Department of Transportation bench mark). Prior to Dec. 13, 1967, nonrecording and crest-stage gages at same site and datum.

AVERAGE DISCHARGE.--14 years, 26.2 cfs (17.02 inches per year).

EXTREMES.--Current year. Maximum discharge, 314 cfs Sept. 24 (gage height, 5.44 ft); minimum, 0.50 cfs July 1, 6, 7 (gage height, 0.72 ft).

Period of record: Maximum discharge, 2,500 cfs May 2, 1964 (gage height, 5.40 ft); minimum, 0.10 cfs May 28, 1962; minimum gage height, 0.60 ft May 28, June 7, 8, 1963.

REMARKS.--Records fair except those for period of no gage-height record, which are poor.

WATER TEMPERATURE (°C).--Oct. 2 (1000) 21°; Nov. 4 (1500) 18°; Dec. 18 (1600) 9°; Jan. 8 (1500) 10°; Jan. 17 (1330) 11°; Feb. 4 (1100) 12°; Mar. 25 (1300) 19°; Apr. 7 (1255) 20°; Apr. 29 (1040) 20°; June 19 (1100) 25°; Aug. 13 (1005) 25°; Sept. 19 (1325) 27°.

09J SUWANNEE RIVER BASIN

213

02315500 Suwannee River at White Springs, Fla.

LOCATION.--Lat 30°19'32", long 82°44'18", in SW quarter sec.8, T.2 S., R.16 E., Columbia County, on left bank at downstream side of bridge on U.S. Highway 41, 1.0 mile southeast of White Springs.

DRAINAGE AREA.--2,390 sq mi, approximately, includes part of watershed in Okefenokee Swamp which is indeterminate.

PERIOD OF RECORD.--May 1906 to December 1908, February 1927 to current year.

GAGE.--Water-stage recorder. Datum of gage is 48.54 ft above mean sea level (Corps of Engineers bench mark). Prior to July 31, 1932, nonrecording gage at site 1.0 mile downstream at same datum.

AVERAGE DISCHARGE.--46 years, 1,816 cfs (10.32 inches per year).

EXTREMES.--Current year: Maximum discharge, 8,610 cfs Sept. 6 (gage height, 24.92 ft); minimum, 139 cfs Dec. 16 (gage height, 2.46 ft).

Period of record: Maximum discharge, 28,500 cfs Apr. 5, 6, 1948; maximum gage height, 36.65 ft Apr. 5, 1948; minimum 4.8 cfs Nov. 15, 1931; minimum gage height, 1.05 ft June 24-26, 1955.

REMARKS.--Records good. See page 214 for table of gage height.

REVISIONS (WATER YEARS).--WSP 1504: 1906, 1908. WSP 1905: Drainage area.

WATER TEMPERATURE (°C).--Nov. 9 (1520) 26.5°; Jan. 14 (0820) 17.0°; Feb. 24 (1510) 16.5°; Apr. 7 (1000) 15.5°; May 26 (1245) 24.5°; June 23 (1410) 29.5°; July 14 (0905) 27.0°; Aug. 19 (1005) 25.5°; Sept. 1 (2005) 25.5°.

09J SUWANNEE RIVER BASIN

02319000 Withlacoochee River near Pinetta, Fla.

LOCATION.--Lat 30°35'43", long 83°15'35", in NW quarter sec.7, T.2 N., R.11 E., Madison County, on right bank 30 ft downstream from highway bridge, 0.1 mile downstream from small tributary, 0.3 mile west of Bellville, 5.6 miles east of Pinetta, and 22 miles upstream from mouth.

DRAINAGE AREA.--2,120 sq mi, approximately.

PERIOD OF RECORD.--October 1931 to current year. Monthly discharge only for October and November 1931, published in WSP 1304.

GAGE.--Water-stage recorder. Datum of gage is 47.21 ft above mean sea level (levels by Corps of Engineers). Prior to Dec. 3, 1941, nonrecording gage at same site and datum.

AVERAGE DISCHARGE.--40 years, 1,603 cfs (10.27 inches per year).

EXTREMES.--Current year: Maximum discharge, 6,920 cfs May 10 (gage height, 17.59 ft); minimum, 158 cfs Dec. 14, 15 (gage height, 6.77 ft).

Period of record: Maximum discharge, 79,400 cfs Apr. 5, 1948 (gage height, 38.64 ft. from floodmarks); minimum, 70 cfs Aug. 23, 1955 (gage height, 6.27 ft).

Maximum stage known, that of Apr. 5, 1948. Flood in August 1928 reached a stage of 36.75 ft. from floodmarks (discharge, 53,600 cfs).

REMARKS.--Records good. Records of chemical analyses and water temperatures for the current year are published in Part 2 of this report. See page 217 for table of gage height.

REVISIONS (WATER YEARS).--WSP 972: 1941-42. WSP 1905: Drainage area.

09J SUWANNEE RIVER BASIN

02319500 Suwannee River at Ellaville, Fla.

LOCATION.--Lat 30°23'04", long 83°10'19", in NE quarter sec.24, T.1 S., R.11 E., Suwannee County, on left bank at Ellaville, 100 ft upstream from Seaboard Air Line Railroad bridge, 200 ft downstream from Withlacoochee River, and 900 ft upstream from bridge on U.S. Highway 90.

DRAINAGE AREA.--6,850 sq mi, approximately, includes part of watershed in Okefenokee Swamp which is indeterminate.

PERIOD OF RECORD.--January 1927 to current year.

GAGE.--Water-stage recorder. Datum of gage is 27.22 ft above mean sea level. Prior to June 20, 1932, nonrecording gage at same site and datum. Nov. 8, 1955 to Sept. 30, 1970, nonrecording gage 1.1 miles downstream from base gage at datum 24.55 ft above mean sea level used as supplementary gage when flow was less than 4,800 cfs.

AVERAGE DISCHARGE.--44 years, 6,425 cfs (12.74 inches per year).

EXTREMES.--Current year: Maximum discharge, 14,100 cfs Sept. 8 (gage height, 14.51 ft); minimum, 2,160 cfs Dec. 25 (gage height, 2.72 ft).

Period of record: Maximum discharge, 95,300 cfs Apr. 7, 8, 1948 (gage height, 40.88 ft, from floodmarks); minimum, 882 cfs July 17, 1955; minimum gage height, 1.56 ft Dec.1, 1968.

REMARKS.--Records good. Since Nov. 7, 1953, slight regulation at low water caused by diversions above control 0.7 mile downstream from gage by a steam-electric powerplant for cooling of condensers. Total diverted flow is returned to river below control. Records include flow of large spring on left bank about 200 ft downstream; spring flow may reverse during high stages. See page 219 for table of gage height.

REVISIONS.--WSP 1905: Drainage area.

WATER TEMPERATURE (°C).--Oct. 1 (1500) 23.0°; Nov. 10 (1305) 19.5°; Jan. 12 (1310) 14.5°; Feb. 17 (0845) 10.0°; Apr. 8 (1045) 15.5°; May 27 (1710) 24.5°; July 19 (1330) 26.0°; Sept. 1 (1200) 25.5°.

09J SUWANNEE RIVER BASIN

221

02320500 Suwannee River at Branford, Fla.

LOCATION.--Lat 29°57'20", long 82°55'40", in NE quarter sec.20, T.6 S., R.14 E., Suwannee County, near left bank on upstream side of bridge on U.S. Highways 27 and 129 at Branford, 10.8 miles upstream from Santa Fe River.

DRAINAGE AREA.--7,740 sq mi, approximately, includes part of watershed in Okefenokee Swamp, which is indeterminate.

PERIOD OF RECORD.--July 1931 to current year.

GAGE.--Nonrecording gage. Datum of gage is 4.81 ft above mean sea level.

AVERAGE DISCHARGE.--40 years, 6,785 cfs (11.90 inches per year).

EXTREMES.--Current year: Maximum discharge, 13,700 cfs Sept. 10, 11; maximum gage height, 16.42 ft Sept. 11; minimum discharge, 3,240 cfs Dec. 27, 28 (gage height, 5.79 ft).

Period of record: Maximum discharge, 83,900 cfs Apr. 11, 1948 (gage height, 34.07 ft); minimum, 1,530 cfs July 1, 2, 1955; minimum gage height, 1.97 ft Jan. 10, 11, 14, 17, 1956.

Flood in August 1928 reached a stage of 32.0 ft, from floodmarks (discharge, 65,000 cfs, computed on basis of measured crest flow at Ellaville).

REMARKS.--Records good. Records of chemical analyses and water temperatures for the current year are published in Part 2 of this report. See page 222 for table of gage height.

REVISIONS.--WSP 1905: Drainage area.

09J SUWANNEE RIVER BASIN

223

02320700 Santa Fe River near Graham, Fla.

LOCATION.--Lat 29°50'46", long 82°13'11", in NE quarter sec.32, T.7 S., R.21 E., Alachua County, near left bank on upstream side of bridge on State Highway 225, 1.0 mile south of Graham, and 1.5 miles upstream from Sampson River.

DRAINAGE AREA.--94.9 sq mi.

PERIOD OF RECORD.--August 1957 to current year.

GAGE.--Water-stage recorder. Datum of gage is 103.55 ft above mean sea level.

AVERAGE DISCHARGE.--14 years, 69.6 cfs (9.96 inches per year).

EXTREMES.--Current year: Maximum discharge, 283 cfs Sept. 9 (gage height, 10.16 ft); minimum, 0.12 cfs June 9 (gage height, 3.42 ft).

Period of record: Maximum discharge, 2,360 cfs Sept. 12, 1964 (gage height, 14.97); minimum, 0.05 cfs May 23, 24, 1968; minimum gage height, 3.42 ft June 9, 1971.

REMARKS.--Records good. Records do not include diversions, during periods of high stages, from Santa Fe Lake Through Lochloosa Creek in St. Johns River basin.

REVISIONS.--WRD Fla. 1968: Drainage area.

WATER TEMPERATURE (°C).--Nov. 4 (1040) 17.5°; Dec. 16 (1210) 14.5°; Feb. 9 (1100) 12.0°; Apr. 1 (1550) 17.0°; May 18 (1120) 21.0°; June 21 (1000) 26.0°; July 7 (1515) 30.0°; Aug. 17 (1015) 24.5°; Aug. 31 (1130) 25.0°.

09J SUWANNEE RIVER BASIN

02321500 Santa Fe River at Worthington Springs, Fla.

LOCATION.—Lat 29°55'18", long 82°25'35", in SE quarter sec.32, T.6 S., R.19 E., Alachua County, near center of span on down side of bridge on State Highway 121, 0.5 mile south of Worthington Springs, and 0.8 mile downstream from New River.

DRAINAGE AREA.—582 sq mi.

PERIOD OF RECORD.—October 1931 to current year. Published as "near Worthington" prior to October 1965. Monthly discharge only for October 1931, published in WSP 1104.

GAGE.—Water-stage recorder. Datum of gage is 42.74 ft above mean sea level (levels by Corps of Engineers). Prior to Jan. 16, 1939, nonrecording gage at site 0.2 mile downstream at same datum and Jan. 16, 1939, to July 23, 1953, nonrecording gage at present site and datum.

AVERAGE DISCHARGE.—40 years, 448 cfs (10.45 inches per year).

EXTREMES.—Current year: Maximum discharge, 2,900 cfs Aug. 21 (gage height, 18.22 ft); minimum, 7.5 cfs June 9 (gage height, 7.26 ft).

Period of record: Maximum discharge, 20,000 cfs Sept. 13, 1964 (gage height, 28.40 ft); minimum discharge, 0.50 cfs June 24, 1955 (gage height, 6.74 ft).

REMARKS.—Records good. Records do not include diversion, during periods of high stages, from Santa Fe Lake through Lochloosa Creek in St. Johns River basin. Record of chemical analyses and water temperatures for the current year are published in Part 2 of this report.

REVISIONS.—WRD Fla. 1968: Drainage area.

6

09J SUWANNEE RIVER BASIN

02322000 Santa Fe River near High Springs, Fla.

LOCATION (revised).—Lat 29°50'33", long 82°37'52", in NE quarter sec.32, T.7 S., R.17 E., Columbia County, near right bank at downstream side of bridge on U.S. Highway 27, 100 ft upstream from Seaboard Coast Line Railroad bridge, and 2 miles northwest of High Springs.

DRAINAGE AREA.—950 sq mi, approximately.

PERIOD OF RECORD.—January 1931 to September 1971 (discontinued).

GAGE.—Water-stage recorder. Datum of gage is 26.36 ft above mean sea level (levels by Florida Department of Transportation). Prior to Jan. 9, 1933, nonrecording gage at same site and datum. Since Oct. 1, 1947, water-stage recorder for station near Fort White (sta 02322500) used as auxiliary gage for this station.

AVERAGE DISCHARGE.—40 years, 846 cfs (12.09 inches per year).

EXTREMES.—Current year: Maximum discharge, 2,580 cfs Aug. 22, 23 (gage height, 5.57 ft); minimum, 209 cfs July 4 (gage height, 1.06 ft).

Period of record: Maximum discharge, 20,000 cfs Sept. 15, 1964; maximum gage height, 18.96 ft Sept. 16, 1964 (backwater from Suwannee River); minimum discharge, 31 cfs Apr. 28 to May 5, 1956; minimum gage height, 0.38 ft May 21, 22, 1957.

REMARKS.—Records good.

REVISIONS (WATER YEARS).—WSP 1704: 1948.

WATER TEMPERATURE (°C).—Nov. 11 (1320) 22.5°; Jan. 11 (1505) 19.5°; Feb. 18 (1200) 15.0°; Apr. 5 (1100) 18.5°; May 24 (1200) 22.5°; July 12 (1310) 25.0°; Sept. 2 (1215) 26.0°.

U.S. Geological Survey

Stage Data for Alligator Lake (Lake City, Fla.)

U.S. Geological Survey
Stage Data for Alligator Lake (Lake City, Fla.)

09J SUWANNEE RIVER BASIN

2-3226. Alligator Lake at Lake City, Fla. (68-69)

LOCATION.--Lat 30°10'31", long 82°37'55", in NE 1/4 sec. 5, T.4 S., R.17 E., Columbia County, on northwest shore near north end of lake, on end of private dock, 1.0 mile south of Lake City.

SURFACE AREA.--346 acres (0.54 sq mi).

DRAINAGE AREA.--15.4 sq mi.

PERIOD OF RECORD.--September 1965 to May 1967 (weekly), June 1967 to current year (fragmentary).

GAGE.--Nonrecording gage. Datum of gage is 87.18 ft above mean sea level. Gage readings have been reduced to elevations above mean sea level.

EXTREMES.--Current year: Maximum daily elevation, 98.48 ft Sept. 22, 28; minimum daily, 91.45 ft Oct. 31.

Period of record: Maximum daily elevation, 99.98 ft Mar. 1, 1966; minimum daily, 90.23 ft Apr. 29, 1968.

REMARKS.--Lake has several contributing creeks but no surface outlet; at low stages lake is separated into several small ponds. Records of chemical analyses for the water year 1969 are published in Part 2 of this report.

WATER TEMPERATURE (°C).--Oct. 1 (1055) 28°; Oct. 31 (1615) 21°; Dec. 12 (1150) 15°; Jan. 29 (1210) 20°; Mar. 12 (1300) 18°; Apr. 22 (1045) 24°; June 20 (1515) 29°; Aug. 6 (1010) 28°.

ELEVATION, IN FEET, WATER YEAR OCTOBER 1968 TO APRIL 1969

	North (base) gage	South (auxiliary) gage
Oct. 1.....	93.40.....	91.94.....
31.....	91.45.....	-
Dec. 12.....	91.54.....	-
26.....	91.56.....	91.86.....
Jan. 29.....	91.61.....	92.08.....
Mar. 12.....	92.62.....	92.43.....
Apr. 22.....	94.23.....	93.74.....

NOTE.--Lake below gage at permanent location Oct. 1 to Apr. 22. Temporary gages installed in the north portion (0.3 mile east; lat 30°10'35", long 82°37'40") and south portion (1.3 mile south; lat 30°09'25"; long 82°38'20") of lake on Oct. 10, 1967.

ELEVATION, IN FEET, MAY TO SEPTEMBER 1969

June 14.....	94.48	July 16.....	95.08	Aug. 8.....	96.48	Sept. 11.....	97.72
16.....	94.63	22.....	95.38	13.....	96.78	18.....	97.88
17.....	94.73	29.....	95.88	19.....	97.08	22.....	98.48
20.....	94.78	Aug. 1.....	96.08	27.....	97.52	28.....	98.48
July 8.....	94.88	6.....	96.40	Sept. 3.....	97.68		

02322600 Alligator Lake at Lake City, Fla. (68-70)

LOCATION.--Lat 30°10'31", long 82°37'55", in NE quarter sec. 5, T.4 S., R.17 E., Columbia County, on northwest shore near north end of lake, on end of private dock, 1.0 mile south of Lake City.

SURFACE AREA.--346 acres (0.54 sq mi).

DRAINAGE AREA.--15.4 sq mi.

PERIOD OF RECORD.--September 1965 to May 1967 (weekly), June 1967 to current year (fragmentary).

GAGE.--Nonrecording gage. Datum of gage is 87.18 ft above mean sea level. Gage readings have been reduced to elevations above mean sea level.

EXTREMES.--Current year: Maximum daily elevation, 98.72 ft Aug. 18; minimum daily, 97.16 ft June 30.

Period of record: Maximum daily elevation, 99.98 ft Mar. 1, 1966; minimum daily, 90.23 ft Apr. 29, 1968.

REMARKS.--Lake has several contributing creeks but no surface outlet; at low stages lake is separated into several small ponds.

WATER TEMPERATURE (°C).--Oct. 2 (0800) 25.0°; Nov. 19 (0715) 17.0°; Jan. 7 (0730) 10.0°; Mar. 9 (1100) 19.0°; May 19 (1800) 28.0°; June 30 (1130) 26.0°; Aug. 18 (0840) 29.5°; Sept. 29 (1730) 26.0°.

ELEVATION, IN FEET, WATER YEAR OCTOBER 1969 TO SEPTEMBER 1970

Oct. 2.....	98.52	Jan. 7.....	98.69
6.....	98.48	Mar. 9.....	98.38
12.....	98.38	May 19.....	97.76
19.....	98.08	June 30.....	97.16
27.....	97.38	Aug. 18.....	99.72
Nov. 19.....	97.32	Sept. 29.....	97.80

APPENDIX 3

DEPARTMENT OF POLLUTION CONTROL

CHAPTER 11-2

POLLUTION OF WATERS

- 11-2.01 Enforcement and appeal
- 11-2.02 Minimum standards of all waters
- 11-2.03 Water quality testing
- 11-2.04 General water quality and water resources
- 11-2.05 Water quality standards, specific
- 11-2.06 Construction of water ways
- 11-2.07 Damages from a water - public
- 11-2.08 Damages from a water - public
- 11-2.09 Damages from a water - public
- 11-2.10 Damages from a water - public
- 11-2.11 Damages from a water - public
- 11-2.12 Damages from a water - public
- 11-2.13 Damages from a water - public
- 11-2.14 Damages from a water - public
- 11-2.15 Damages from a water - public
- 11-2.16 Damages from a water - public
- 11-2.17 Damages from a water - public
- 11-2.18 Damages from a water - public
- 11-2.19 Damages from a water - public
- 11-2.20 Damages from a water - public
- 11-2.21 Damages from a water - public
- 11-2.22 Damages from a water - public
- 11-2.23 Damages from a water - public
- 11-2.24 Damages from a water - public
- 11-2.25 Damages from a water - public

11-2.01 Enforcement and appeal. The Florida Pollution Control Board is authorized to enforce any provision of the laws of the State of Florida relating to the pollution of waters of the State and the process of water quality management is hereby established. The Board is authorized to enforce any provision of the laws of the State of Florida relating to the pollution of waters of the State and the process of water quality management is hereby established.

The policy of the State of Florida is to protect water quality and to prevent the pollution of waters of the State. The Board is authorized to enforce any provision of the laws of the State of Florida relating to the pollution of waters of the State and the process of water quality management is hereby established. The Board is authorized to enforce any provision of the laws of the State of Florida relating to the pollution of waters of the State and the process of water quality management is hereby established.

The Board is authorized to enforce any provision of the laws of the State of Florida relating to the pollution of waters of the State and the process of water quality management is hereby established.

enacted under the authority of the Federal Water Pollution Control Act, as amended. The Board is authorized to enforce any provision of the laws of the State of Florida relating to the pollution of waters of the State and the process of water quality management is hereby established.

11-2.02 Minimum standards of all waters. The Board is authorized to enforce any provision of the laws of the State of Florida relating to the pollution of waters of the State and the process of water quality management is hereby established. The Board is authorized to enforce any provision of the laws of the State of Florida relating to the pollution of waters of the State and the process of water quality management is hereby established.

11-2.03 Water quality testing. The Board is authorized to enforce any provision of the laws of the State of Florida relating to the pollution of waters of the State and the process of water quality management is hereby established.

11-2.04 General water quality and water resources. The Board is authorized to enforce any provision of the laws of the State of Florida relating to the pollution of waters of the State and the process of water quality management is hereby established.

11-2.05 Water quality standards, specific. The Board is authorized to enforce any provision of the laws of the State of Florida relating to the pollution of waters of the State and the process of water quality management is hereby established.

11-2.06 Construction of water ways. The Board is authorized to enforce any provision of the laws of the State of Florida relating to the pollution of waters of the State and the process of water quality management is hereby established.

11-2.07 Damages from a water - public. The Board is authorized to enforce any provision of the laws of the State of Florida relating to the pollution of waters of the State and the process of water quality management is hereby established.

11-2.08 Damages from a water - public. The Board is authorized to enforce any provision of the laws of the State of Florida relating to the pollution of waters of the State and the process of water quality management is hereby established.

11-2.09 Damages from a water - public. The Board is authorized to enforce any provision of the laws of the State of Florida relating to the pollution of waters of the State and the process of water quality management is hereby established.

11-2.10 Damages from a water - public. The Board is authorized to enforce any provision of the laws of the State of Florida relating to the pollution of waters of the State and the process of water quality management is hereby established.

11-2.11 Damages from a water - public. The Board is authorized to enforce any provision of the laws of the State of Florida relating to the pollution of waters of the State and the process of water quality management is hereby established.

11-2.12 Damages from a water - public. The Board is authorized to enforce any provision of the laws of the State of Florida relating to the pollution of waters of the State and the process of water quality management is hereby established.

11-2.13 Damages from a water - public. The Board is authorized to enforce any provision of the laws of the State of Florida relating to the pollution of waters of the State and the process of water quality management is hereby established.

State of Florida Rules

Pollution of Waters

RULES
OF THE
DEPARTMENT OF POLLUTION CONTROL
CHAPTER 17-3
POLLUTION OF WATERS

- 17-3.01 Declaration and intent
- 17-3.02 Minimum conditions of all waters; times and places
- 17-3.03 Water quality testing
- 17-3.04 General water quality and waste treatment
- 17-3.05 Water quality standards; specifics
- 17-3.06 Classification of waters, usage
- 17-3.07 Criteria: Class I waters — public water supply
- 17-3.08 Criteria: Class II waters — shellfish propagation and harvesting
- 17-3.09 Criteria: Class III waters — recreation — propagation and management of fish and wildlife
- 17-3.10 Criteria: Class IV waters — agricultural and industrial water supply
- 17-3.11 Criteria: Class V waters — navigation, utility and industrial use
- 17-3.12 Definitions
- 17-3.13 Drainage wells, permits
- 17-3.14 Drainage wells, applications
- 17-3.15 Effective date of permits
- 17-3.16 Drainage wells, drilling requirements
- 17-3.17 Drainage well permit revocation or modification
- 17-3.18 Test wells and borings
- 17-3.19 Abandoned wells
- 17-3.20 Pollution surveys
- 17-3.21 Classified waters

17-3.01 Declaration and intent. The Florida Pollution Control Board in order to more properly protect the waters of the State of Florida, declares that the presence of pollutants in excess of concentrations hereinafter provided is harmful to the waters of this State and the presence of such excessive concentrations is deemed to be prima facie evidence of pollution of the waters of the State of Florida and the same is expressly prohibited.

The policy inherent in the standards shall be to protect water quality existing at the time these water quality standards were adopted or to upgrade or enhance water quality within the State of Florida. In any event where a new or increased source of pollution poses a possibility of degrading existing high water quality, such project development shall not be issued a Department permit until the Board is satisfied that such development will not be detrimental to the best interests of the State and necessary to its social and economic development. In administering the policy, high quality receiving waters will be protected by requiring as a part of the initial project design the highest and best practicable treatment available under existing technology.

The Board recognizes and will protect the interest of the Federal Government in interstate and

coastal waters in accordance with the Federal Water Pollution Control Act, as amended. The Board further shall consult with the U.S. Department of the Interior on all matters affecting the Federal interest in a cooperative effort.

It is the intent of the State of Florida to review Class V stream classifications periodically as often as necessary, and as water quality of such areas improves, hearings will be held and reclassification shall be established. It is expected that in all instances presently classified as Class V. Waters, there shall be decided and definitive enhancement not later than January 1, 1973.

General Authority 403.061 FS. Law Implemented 403.021, 403.061, 403.101 (1), 403.182, 403.261 FS. History—Formerly 28-5.01.

17-3.02 Minimum conditions of all waters; times and places.

The following minimum conditions are applicable to all waters, at all places and at all times. Within the territorial limits of this state all such waters shall be free from:

(1) **Settleable Substances** — substances attributable to municipal, industrial, agricultural, or other discharges that will settle to form putrescent or otherwise objectionable sludge deposits.

(2) **Floating Substances** — floating debris, oil, scum, and other floating materials attributable to municipal, industrial, agricultural, or other discharge in amounts sufficient to be unsightly or deleterious.

(3) **Deleterious Substances** — materials attributable to municipal, industrial, agricultural or other discharges producing color, odor, or other conditions in such degree as to create a nuisance.

(4) **Toxic Substances** — substances attributable to municipal, industrial, agricultural, or other discharges in concentrations or combinations which are toxic or harmful to humans, animal, plant, or aquatic life.

General Authority 403.061 FS. Law Implemented 403.021, 403.031, 403.061, 403.101(1) FS. History—Formerly 28-5.02, Amended 10-28-70.

17-3.03 Water quality testing. Tests or analytical procedures to determine compliance or noncompliance with water quality criteria provided by this chapter shall be in accordance with methods given in the latest edition of Standard Methods for the Examination of Water and Wastewater, published by the American Public Health Association, American Water Works Association and Water Pollution Control Federation; and a copy of same shall be available for public inspection at the offices of the Pollution Control Board. Where other tests or analytical procedures are found to be more satisfactory, such tests or procedures will be used only upon the acceptance and approval by the regulatory agency.

General Authority 403.061 FS. Law Implemented 403.021, 403.031, 403.061, 403.101 FS. History—Formerly 28-5.03.

17-3.04 General water quality and waste treatment.

(1) Sewage, Industrial Wastes or Other Wastes — Any industrial wastes or other wastes shall be effectively treated by the latest modern technological advances as approved by the regulatory agency.

All discharges from municipal and privately owned domestic waste plants will comply with the Water Quality Standards of the State of Florida with 90% treatment or better as expeditiously as possible, but not later than January 1, 1973, except that those plants discharging sanitary sewage through ocean outfalls or disposal wells must provide for at least 90% treatment or better as deemed necessary by the Department not later than January 3, 1974.

The degree of treatment for industrial waste has been further defined as follows: That which provides an effluent equivalent to that produced by the highest quality municipal waste treatment, but in no case shall the efficiency be less than 90% organic removal. In some cases, due to waste characteristics, it will be necessary that the efficiency exceed 90%. In the case of inorganic wastes, waste treatment shall have similar efficiencies. The 90% organic and inorganic removal factor shall be applied against the total untreated waste produced by a given plant. All discharges from industrial waste treatment plants shall attain such treatment efficiency as expeditiously as possible, but not later than January 1, 1973.

(2) Advanced Waste Treatment —

(a) Intent — Chapter 403.086(1), Florida Statutes, as amended by Chapter 72-58 (Laws of Florida 1972), and Chapter 17-3.04, Florida Administrative Code, set forth certain minimum requirements for the treatment of sanitary wastes. These provide that a minimum treatment efficiency of 90 percent, or advanced waste treatment as deemed necessary and ordered by the Department, shall be attained by facilities for the disposal of sanitary wastes.

The purpose of this subsection is to establish criteria for advanced waste treatment for sanitary waste and for alternative forms of sanitary waste disposal, however, nothing in this subsection shall relieve a person from compliance with all other applicable provisions of 17-3, Florida Administrative Code.

(b) Definitions

1. Advanced waste treatment is that treatment which will provide an effluent containing not more than the following concentrations:

- | | |
|--|--------|
| a. Biochemical Oxygen Demand (BOD ₅) | 5 mg/l |
| b. Suspended Solids | 5 mg/l |
| c. Total Phosphorous, expressed as P | 1 mg/l |
| d. Total Nitrogen expressed as N | 3 mg/l |

2. Disinfection shall be provided so that contact time shall be not less than fifteen minutes at maximum flow and the effluent shall have a free chlorine residual of not less than 1.0 mg/l, or equivalent.

3. Alternate effluent disposal is a minimum of secondary treatment (90 percent) followed by an effluent disposal system approved by the Department which will prevent any effluent from being discharged to the surface waters of the State. Such disposal may include land disposal, deep injection wells, or

combinations thereof, or other methods approved by the Department.

(c) Requirements

1. The following requirements apply to those treatment facilities for the disposal of sanitary wastes into Old Tampa Bay, Tampa Bay, Hillsborough Bay, Boca Ciega Bay, St. Joseph Sound, Clearwater Bay, Sarasota Bay, Little Sarasota Bay, Roberts Bay, Lemon Bay, Punta Gorda Bay, and any bay, bayou or sound tributary thereto.

a. Existing Facilities. All those facilities for the treatment of sanitary waste which existed without a Department permit or variance or had either a Department construction permit, temporary operating permit, operating permit, or variance prior to March 15, 1972, including the expansion of existing facilities, shall provide for advanced waste treatment or alternate effluent disposal. The owners of existing facilities shall provide the Department as soon as possible, but not later than three months after the effective date of this rule, with a preliminary plan for compliance with this Section and a time schedule for the implementation of said plan which schedule shall be submitted within six months after approval by the Department of the preliminary plan, except that any facility for which certification has been received from the Department for state or federal grants and/or loans for a modification or expansion of said facility which will provide not less than ninety (90) per cent treatment, including nitrogen and phosphorous, shall be deemed to comply with these requirements.

b. New Facilities. All those facilities for the treatment of sanitary waste not defined as existing facilities in 17-3.04 (2) (c) 1.a. shall provide for advanced waste treatment, or shall provide for alternate effluent disposal.

2. Other Facilities. All other facilities for the disposal of sanitary wastes into waters of the State other than those in 17-3.04 (2)(c) 1.a. shall provide advanced waste treatment or alternate effluent disposal as deemed necessary and ordered by the Department.

(3) Chemical Constituents and Compounds — Presence of certain other elements, organic and inorganic compounds are recognized to affect water quality and aquatic life. These substances often occur naturally in streams or lakes and may be difficult to measure accurately and their effects are usually indirect or accentuated when found in combination with substances or conditions listed in the established criteria.

(4) When any of the constituents listed below occur in any amounts in any individual body of water, they shall be suspected of degrading the quality of the particular lake or stream. As improvement in analytical technique dictates, exact numerical threshold criteria may be established, but the same shall not be limited to the following:

Sulfates	Free Mineral Acids
Sulfides	Nitrates
Nickel	Phosphates
Aluminum	Potassium

General Authority 403.061(7) F.S. Law Implemented 403.021, 403.031, 403.061, 403.085, 403.086, 403.101 F.S. Chapter 72-58 (Laws of Florida, 1972) History— Formerly 28-5.04, Amended 10-28-70, 10-17-72.

17-3.05 Water quality standards; specifics.

(1) The criteria of water quality hereinafter provided will be applied only after reasonable

opportunity for mixture of wastes with receiving waters has been afforded; the reasonableness of the opportunity for mixture of wastes and receiving waters shall be determined on the basis of the physical characteristics of the receiving waters and the methods in which the discharge is physically made shall be approved by the regulatory agency.

(2) The following water quality standards shall be the criteria for pollution when concentrations exceed following limitations:

(a) Fluorides — shall not exceed 1.4 to 1.6 mg/l as fluoride ion, depending on annual average daily air temperature for at least a five-year period for sources of Class I public water supplies measured immediately above or adjacent to raw water intake.

(b) Fluorides — for waters not used for public water supplies, shall not exceed 10.0 mg/l as fluoride ion or will not interfere with other beneficial uses.

(c) Chlorides — chlorides shall not exceed two hundred fifty (250) mg/l in streams considered to be fresh water streams; in other waters of brackish or saline nature the chloride content shall not be increased more than ten per cent (10%) above normal background chloride content.

(d) Turbidity — shall not exceed fifty (50) Jackson units as related to standard candle turbidimeter above background.

(e) Dissolved Oxygen — shall not be artificially depressed below the values of four (4.0) ppm unless background information available to the regulatory agency indicates prior existence under unpolluted conditions of lower values. In such cases, lower limits may be utilized after approval by the regulatory authority.

(f) BOD — shall not be altered to exceed values which would cause dissolved oxygen to be depressed below the limit listed above and, in no case, shall it be great enough to produce nuisance conditions.

(g) Dissolved Solids — not to exceed five hundred (500) mg. per liter as a monthly average or exceed one thousand (1,000) mg. per liter at any time.

(h) Specific Conductance — shall not be

increased more than one hundred per cent (100%) above background levels or to a maximum level of 500 micromhos per centimeter (cm) for streams considered to be fresh water streams.

(i) Radioactive Substances, Gross Beta Activity — (in known absence of strontium — 90 and alpha emitters), not to exceed one thousand (1,000) micromicrocuries at any time. See also Chapter 10D-4.

(j) Cyanide or Cyanates — none detectable.

(k) Copper — shall not exceed 0.5 mg/l

(l) Zinc — shall not exceed 1.0 mg/l

(m) Chromium — shall not exceed 0.50 mg/l hexavalent or 1.0 mg/l total chromium in effluent discharge and shall not exceed 0.05 mg/l after reasonable mixing in the receiving stream.

(n) Phenolic type compounds calculated or reported as phenol — shall not exceed 0.001 mg/l

(o) Lead — shall not exceed 0.05 mg/l

(p) Iron — shall not exceed 0.30 mg/l

(q) Arsenic — shall not exceed 0.05 mg/l

(r) Oils and Greases — shall not exceed fifteen (15) mg/l, or that no visible oil, defined as iridescence, be present to cause taste and odors, or interfere with other beneficial uses.

(s) pH — of receiving waters shall not be caused to vary more than one (1.0) unit above or below normal pH of the waters; and lower value shall be not less than six (6.0), and upper value not more than eight and one-half (8.5). In cases where pH may be, due to natural background or causes, outside limits stated above, approval of the regulatory agency shall be secured prior to introducing such material in waters of the state.

(t) Detergents — shall not exceed one-half (0.5) mg/l

(u) Mercury — none detectable in effluent discharge.

(3) All discharges or proposed discharges of heated water into receiving bodies of water (RBW) which are controlled by the state shall be subjected to a thorough study to assess the consequences of the discharge upon the environment. The state shall be

divided into two general climatological zones: Peninsular Florida, which varies from tropical in nature to temperate but is modified by the peninsular configuration and is the area south of latitude 30°N (excluding Gulf and Franklin Counties); and Northern Florida which is temperate and continental and is the area above latitude 30°N plus the portions of Gulf and Franklin Counties which lie below 30°N.

(a) Heated water discharges existing on July 1, 1972:

(i) Shall not increase the temperature of the RBW so as to cause damage or harm to the aquatic life or vegetation therein or interfere with beneficial uses assigned to the RBW.

(ii) Shall be monitored by the discharger to ensure compliance with this rule, and

(iii) Shall be converted to offstream cooling or approved alternate methods in the event such monitoring produces evidence of substantial damage.

(b) Heated water sources proposed for future discharges into RBW controlled by the state shall not increase the water temperature by more than the monthly temperature limits prescribed for the particular type and location of the RBW. New sources shall include all expansions, modifications, alterations, replacements, or repairs which result in an increased output of ten percent (10%) or more of the level of energy production which existed on the date this rule became effective. Water temperatures shall be measured by procedures approved by the Florida Department of Pollution Control (DPC). In all cases where a temperature rise above ambient is allowed and a maximum RBW temperature is also prescribed, the lower of the two limitations shall be the control temperature.

(c) Definitions.

(i) Ambient (natural) temperature of a RBW is the existing temperature of the receiving water at a location which is unaffected by manmade thermal discharges and a location which is also of a depth and exposure to winds and currents which typify the most environmentally stable portions of the RBW.

(ii) Coastal waters shall be all waters in the state which are not classified as fresh waters or as open waters.

(iii) A cooling pond is a body of water enclosed by natural or constructed restraints which has been approved by the Florida DPC for purposes of controlling heat dissipation from thermal discharges.

(iv) An existing heat source is any thermal discharge (a) which is presently taking place, or (b) which is under construction or for which a construction or operating permit has been issued prior to the effective date of this rule.

(v) Fresh waters shall be all waters of the state which are contained in lakes and ponds, or are in flowing streams above the zone in which tidal actions influence the salinity of the water and where the concentration of chloride ions is normally less than 1500 mg/l.

(vi) Open waters shall be all waters in the state extending seaward from the most seaward 18-foot depth contour line (three-fathom bottom depth contour) which is offshore from any island; exposed or submerged bar or reef; or mouth of any embayment or estuary which is narrowed by headlands. Contour lines shall be determined from Coast and Geodetic Survey Charts.

(vii) The point of discharge (POD) for a heated water discharge shall be primarily that point at which the effluent physically leaves its carrying conduit (open or closed), and discharges into the waters of the state, or, in the event it is not practicable to measure temperature at the end of the discharge conduit, a specific point designated by the Florida Department of Pollution Control for that particular thermal discharge.

(viii) Heated water discharges are the effluents from commercial or industrial activities or processes in which water is used for the purpose of transporting waste heat, and which constitute heat sources of one million British Thermal Units per hour (1,000,000 BTU/HR.), or greater.

(d) Monthly and Maximum Temperature Limits

(i) Fresh Waters — Heated water with a temperature at the POD more than 5°F higher than the ambient (natural) temperature of any stream shall not be discharged into such stream. At all times under all conditions of stream flow the discharge temperature shall be controlled so that at least two-thirds (2/3) of the width of the stream's surface remains at ambient (natural) temperature. Further, no more than one-fourth (1/4) of the cross-section of the stream at a traverse perpendicular to the flow shall be heated by the discharge. Heated water with a temperature at the POD more than 3°F higher than the ambient (natural) temperature of any lake or reservoir shall not be discharged into such lake or reservoir. Further, no heated water with a temperature above 90°F shall be discharged into any fresh waters in Northern Florida regardless of the ambient temperature of the RBW. In Peninsular Florida, heated waters above 92°F shall not be discharged into fresh waters.

(ii) Coastal Waters — Heated water with a temperature at the POD more than 2°F higher than the ambient (natural) temperature of the RBW shall not be discharged into coastal waters in any zone during the months of June, July, August, and September. During the remainder of the year, heated water with a temperature at the POD more than 4°F higher than the ambient (natural) temperature of the RBW shall not be discharged into coastal waters in any zone. In addition, during June, July, August, and September, no heated water with a temperature above 92°F shall be discharged into coastal waters. Further, no heated water with a temperature above 90°F shall be discharged into coastal waters during the period October thru May.

(iii) Open Waters — Heated water with a temperature at the POD up to 17°F above ambient (natural) temperature of the RBW may be discharged from an open or closed conduit into open waters under the following restraints: The surface temperature of the RBW shall not be raised to more than 97°F and the POD must be sufficient distance offshore to ensure that the adjacent coastal waters are not heated beyond the temperatures permitted in such waters.

(iv) Cooling Ponds — The temperature for heated water discharged from a cooling pond shall be measured at the POD from the pond, and the temperature limitation shall be that specified for the RBW.

(e) General.

(i) Daily seasonal temperature variations that

were normal to the RBW before the addition of heat from other than natural causes shall be maintained.

(ii) Recapitulation of temperature limitations prescribed above:

ZONE	STREAMS	LAKES	COASTAL		OPEN
			SUMMER	REMAINDER	
NORTH.	90°F Max. AM. +5°F	90°F Max. AM. +3°F	92°F Max. AM. +2°F	90°F Max. AM. +4°F	97°F Max. AM. +17°
PENIN.	92°F Max. AM. +5°F	92°F Max. AM. +3°F	92°F Max. AM. +2°F	90°F Max. AM. +4°F	97°F Max. AM. +17°F

(4) Exceptions — in cognizance of the fact that certain waters of the state, due to natural causes, may not fall within desired or prescribed limitations outlined above, the Board is empowered to authorize exceptions to limitations upon presentation of good and sufficient evidence. In no case shall it be lawful to authorize disposition or introduction of materials in waters of the state which will cause material harm or damage to said waters.

General Authority 403.061 FS. Law Implemented 403.021, 403.031, 403.061, 403.101 FS. History—Formerly 28-5.05, Amended 2-17-71, 8-30-72.

17-3.06 Classification of waters, usage.

The waters of Florida are classified according to their usage as follows:

Class I — Public Water Supplies

Class II — Shellfish Harvesting

Class III — Recreation — Propagation and management of fish and wildlife

Class IV — Agricultural and industrial water supply

Class V — Navigation, utility and industrial use

General Authority 403.061 FS. Law Implemented 403.021, 403.031, 403.061, 403.101(1) FS. History—Formerly 28-5.06.

17-3.07 Criteria: Class I waters — public water supply.

The following criteria are for classification of any waters from which water is withdrawn for treatment and distribution as a potable supply.

(1) Sewage, Industrial Wastes, or Other Wastes — any industrial wastes or other wastes shall be effectively treated by the latest modern technological advances as approved by the regulatory agency.

(2) Odor — threshold odor number not to exceed 24 at 60 ° C as a daily average.

(3) pH — of receiving waters shall not be caused to vary more than one (1.0) unit above or below normal pH of the waters; and lower value shall not be less than six (6.0), and the upper value not more than eight and one-half (8.5). In cases where pH may be, due to natural background or causes, outside limits stated above, approval of the regulatory agency shall be secured prior to introducing such material in waters of the state.

(4) Dissolved Oxygen — shall not be artificially depressed below the values of four (4.0) ppm unless background information available to the regulatory agency indicates prior existence under unpolluted conditions of lower values. In such cases, lower limits may be utilized after approval by the regulatory authority.

(5) Toxic Substances — free from substances attributable to municipal, industrial, agricultural or

other discharges in concentrations or combinations which are toxic or harmful to humans, animal or aquatic life.

(6) Bacteriological Quality — coliform group not to exceed 1,000 per 100 ml as a monthly average, (either MPN or MF counts); nor to exceed this number in more than 20% of the samples examined during any month; nor exceed 2,400 per 100 ml (MPN or MF count) on any day.

General Authority 403.061 FS. Law Implemented 403.021, 403.031, 403.061, 403.101 FS. History—Formerly 28-5.07.

17-3.08 Criteria: Class II waters — shellfish harvesting.

The following criteria are for classification of waters in areas which either actually or potentially have the capability of supporting recreational or commercial shellfish propagation and harvesting. Harvesting may only occur in areas approved by the Division of Health, Florida Department of Health and Rehabilitative Services.

(1) Bacteriological Quality, Coliform Group — areas classified for shellfish harvesting, the median coliform MPN (Most Probable Number) of water cannot exceed seventy (70) per hundred (100) ml., and not more than ten (10) per cent of the samples ordinarily exceed an MPN of two hundred and thirty (230) per one hundred (100) ml. in those portions of areas most probably exposed to fecal contamination during most unfavorable hydrographic and pollutional conditions.

(2) Sewage, Industrial Wastes, or Other Wastes — any industrial wastes or other wastes shall be effectively treated by the latest modern technological advances as approved by the regulatory agency.

(3) pH — of receiving waters shall not be caused to vary more than one (1.0) unit above or below normal pH of the waters; and lower value shall be not less than six (6.0) and upper value not more than eight and one-half (8.5). In cases where pH may be, due to natural background or causes, outside limits stated above, approval of the regulatory agency shall be secured prior to introducing such material in waters of the state.

(4) Dissolved Oxygen — shall not be artificially depressed below the values of four (4.0) ppm unless background information available to the regulatory agency indicates prior existence under unpolluted conditions of lower values. In such cases, lower limits may be utilized after approval by the regulatory authority.

(5) Toxic Substances — free from substances attributable to municipal, industrial, agricultural or other discharges in concentrations or combinations which are toxic or harmful to humans, animal or aquatic life.

(6) Odor — threshold odor number not to exceed 24 at 60°C as a daily average.

General Authority 403.061 FS. Law Implemented 403.021, 403.031, 403.061, 403.101 FS. History—Formerly 28-5.08, Amended 6-10-72, 8-30-72.

17-3.09 Criteria: Class III waters — recreation — propagation and management of fish and wildlife.

The following criteria are for classification of waters to be used for recreational purposes, including such body contact activities as swimming and water skiing; and for the maintenance of a well-balanced fish and wildlife population. All surface waters within and coastal waters contiguous to these basins, including off-shore waters, not otherwise classified shall be classified as Class III; however, waters of the open ocean shall be maintained at a dissolved oxygen of not less than five (5.0) ml/l. Streams specifically listed in Section 17.3.21 by a separate listing designated as "Special Stream Classification" shall similarly be maintained at a minimum dissolved oxygen level of five (5.0) ml/l.

(1) Sewage, industrial wastes, or other wastes — any industrial waste or other wastes shall be effectively treated by the latest modern technological advances as approved by the regulatory agency.

(2) pH — of receiving waters shall not be caused to vary more than one (1.0) unit above or below normal pH of the waters; and lower value shall be not less than (6.0), and upper value not more than eight and one-half (8.5). In cases where pH may be, due to natural background or causes outside limits stated above, approval of the regulatory agency shall be secured prior to introducing such material in waters of the state.

(3) Dissolved Oxygen — shall not be artificially depressed below the values of four (4.0) ppm unless background information available to the regulatory agency indicates prior existence under unpolluted conditions of lower values. In such cases, lower limits may be utilized after approval by the regulatory authority.

(4) Bacteriological — coliform group not to exceed 1,000 per 100 ml as a monthly average, (either MPN or MF counts); nor to exceed this number in more than 20% of the samples examined during any month; nor exceed 2,400 per 100 ml (MPN or MF count) on any day. This criteria shall apply only to waters used for body contact activities.

(5) Toxic substances — free from substances attributable to municipal, industrial, agricultural or other discharges in concentrations or combinations which are toxic or harmful to humans, animal or aquatic life.

(6) Deleterious — free from materials attributable to municipal, industrial, agricultural, or other discharges producing color, odor or other conditions in such degree as to create a nuisance.

(7) Turbidity — shall not exceed fifty (50) Jackson units as related to standard candle turbidimeter above background.

General Authority 403.061 FS. Law Implemented 403.021, 403.031, 403.061, 403.101 FS. History—Formerly 28-5.09, Amended 6-10-72, 8-30-72.

17-3.10 Criteria: Class IV waters — agricultural and industrial water supply.

The following criteria are for classification of waters to be used for agricultural or stock watering, or industrial water supply. Additionally, all secondary

and tertiary canals wholly within agricultural areas are Class IV waters.

(1) Sewage, industrial wastes or other wastes — none which are not effectively treated or controlled to the satisfaction of the regulatory agency.

(2) pH — not more than one (1.0) unit from the normal or not less than six (6.0) nor greater than 8.5.

(3) Dissolved oxygen — shall not be depressed below the values of four (4.0) ppm unless background information available to the regulatory agency indicates prior existence under unpolluted conditions of lower values. In such cases, lower limits may be utilized after approval by the regulatory authority.

(4) Color, odor, and taste producing substances and other deleterious substances, including other chemical compounds, attributable to domestic wastes, industrial wastes, and other wastes — only such amounts as will not render the waters unsuitable for agricultural irrigation, livestock watering, industrial cooling, industrial process water supply purposes and fish survival.

(5) Turbidity — shall not exceed fifty (50) Jackson units as related to standard candle turbidimeter above background.

General Authority 403.061 FS. Law Implemented 403.021, 403.031, 403.061, 403.101 FS. History—Formerly 28-5.10, Amended 6-10-72, 8-30-72.

17-3.11 Criteria: Class V waters — navigation, utility and industrial use.

The following criteria are for classification of waters which will be suitable for navigation and any other uses except for waters previously classified in this Chapter:

(1) Sewage, Industrial or Other wastes — none which are not effectively treated or controlled to the satisfaction of the regulatory agency.

(2) pH — not lower than 5.0 nor greater than 9.5 except certain swamp waters which may be as low as 4.5.

(3) Dissolved oxygen — sufficient to be aerobic. The term "aerobic" is defined as "being not less than one (1.) ppm with an average value of not less than two (2.0)ppm."

(4) Odor producing substances — only in such amounts that will not unreasonably interfere with the use of the water for the designated purpose of this classification.

General Authority 403.061 FS. Law Implemented 403.021, 403.031, 403.061, 403.101 FS. History—Formerly 28-5.11.

17-3.12 Definitions.

(1) Definitions of technical terms used shall be in accordance with the glossary — water and sewage control engineering, standard methods for the examination of water and wastewater and the condensed chemical dictionary.

(2) Drainage well shall be considered to have the same meaning as absorbing well.

General Authority 403.061 FS. Law Implemented 403.021, 403.031, 403.061, 403.101 FS. History—Formerly 28-5.12.

17-3.13 Drainage wells, permits. Before any municipal or private corporation or persons shall use an existing well or sink, drive or drill a new well for discharge of sewage or surface water, the owner of existing well or well drilling contractor and owner of property in the case of a new well shall apply to the Department for a permit authorizing drilling and use

of said well.

General Authority 403.061 FS. Law Implemented 403.021, 403.031, 403.061, 403.182 FS. History—Formerly 28-5.13.

17-3.14 Drainage well, applications.

Application for drainage well permit shall be on form supplied by the Board and accompanied by the following data:

(1) Completed report of inspection by county or regional sanitary engineer.

(2) Location and depth of well and depth of casing of all water supply wells within one (1) mile radius of proposed well.

(3) Nature of waters to be discharged into proposed drainage well including analysis thereof, source, estimated quantity and pertinent bacteriological analyses if deemed necessary by the Board.

(4) If transmittal ditches or depressions are used to allow flow of surface or other waters to the well, a complete drawing of drained area shall be supplied and considered a part of drainage structure.

(5) If drainage well or drainage structure will present possible pollution hazard to underground water or water supply wells within one (1) mile thereof, additional data may be requested.

(6) All applications shall be signed by the well drilling contractor and owner of property where proposed well or drainage structure is located or his duly authorized agent.

(7) In all cases except for wells to receive condenser cooling waters or where receiving aquifer or aquifers contain fifteen hundred (1500) parts per million or more of chlorides, bacteriological examination must be made of water from all water supply wells within one (1) mile radius that are drilled to approximate depth of proposed drainage well. The bacteriological survey shall be conducted in following manner:

(a) Samples shall be collected from each well for the first three (3) days of each week for period of four (4) weeks.

(b) Duplicate samples shall be collected in each case after well has been pumped at least twenty (20) minutes. Whenever a drainage well installation is approved following preliminary bacteriological survey of neighboring water supply wells, an identical survey of the same well shall be conducted following opening of drainage well.

General Authority 403.061 FS. Law Implemented 403.021, 403.061, 403.101, 403.182 FS. History—Formerly 28-5.14.

17-3.15 Effective date of permits. No permit for operation or drilling of a drainage well shall become effective or operative until filed with the clerk of the circuit court as required in Section 387.03 FS.

General Authority 403.061 FS. Law Implemented 403.021, 403.061, 403.182 FS. History—Formerly 28-5.15.

17-3.16 Drainage wells, drilling requirements.

(1) A log showing various strata pierced by the well shall be forwarded to the Department within two (2) days after completion of drilling operation.

(2) Samples of strata formations pierced in drilling shall be forwarded to the state geologist, P.O.

Drawer 631, Tallahassee, when drilling is completed.

(3) If casing is used within the well it shall be first-quality lap-welded pipe only. Use of butt welded pipe is prohibited.

(4) Practice of dynamiting clogged wells shall not be resorted to except upon written permission of the Board.

General Authority 403.061 FS. Law Implemented 403.021, 403.061, 403.101, 403.182 FS. History—Formerly 28-5.16.

17-3.17 Drainage well permit revocation or modification. Drainage well permits are revocable or subject to modification by the Board in accordance with provisions of Section 387.03 and Sections 120.20 through 120.28 FS. Pumping into drainage wells unless specifically authorized in permit will constitute violation of permit and be cause for permit revocation.

General Authority 403.061 FS. Law Implemented 403.021, 403.061, 403.182 FS. History—Formerly 28-5.17.

17-3.18 Test wells and borings. Test wells or borings shall be filled with concrete within five (5) days after completion of testing purposes for which it was drilled. Such test wells or borings shall not be used as drainage wells unless permit has been obtained in accordance with this chapter. Failure to obtain permit prior to drilling of said well or boring shall bar future use except for testing purposes not connected with drainage in any manner whatsoever.

General Authority 403.061 FS. Law Implemented 403.021, 403.061, 403.101, 403.182 FS. History—Formerly 28-5.18.

17-3.19 Abandoned wells. Within ten (10) days after abandonment of drainage wells they shall be backfilled from bottom to top with neat cement grout.

General Authority 403.061 FS. Law Implemented 403.021, 403.061 FS. History—Formerly 28-5.19.

17-3.20 Pollution surveys. Surveys of surface waters including treatment plant effluents shall be made in accordance with good sanitary engineering practice and shall be of sufficient scope to provide information as requested by the Board in cases where the Board deems such survey necessary to provide information relative to request for additional loading on sewage treatment plant or evaluate effect of such existing facilities on receiving waters. Such surveys shall take into account factors such as physical, chemical, biological and bacteriological which are pertinent.

General Authority 403.061 FS. Law Implemented 403.021, 403.061, 403.101, 403.182 FS. History—Formerly 28-5.20.

17-3.21 Classified waters. Pursuant to the criteria of water classification, Sections 17-3.06 through 17-3.11, inclusive, the waters of the State of Florida are classified by river basins or sub-basins as Class III — Recreation — Propagation and Management of Fish and Wildlife with only the individual exceptions to Class III listed within each basin. (Classifications are not printed in the Code pursuant to Section 120.051(1)(e), Florida Statutes, but as filed are of full force and effect).

General Authority 403.061 FS. Law Implemented 403.021, 403.061 FS. History—Formerly 28-5.21, Amended 6-10-72.

APPENDIX 4

ARTICLE

III

THE STATE OF FLORIDA

DEPARTMENT OF HEALTH AND HUMAN SERVICES

CHAPTER 17.8

AIR POLLUTION

17.801 Definitions and intent.
17.802 Definitions.
17.803 General Regulations.
17.804 Pollution Act.
17.805 Ambient Air Quality Standards.
17.806 Air Pollution Control.
17.807 Sampling and Testing.
17.808 Other Regulations.

17.801 Definitions and intent. The purpose of Florida Department of Health and Human Services is to protect the health of the people of the state by preventing, controlling, and abating air pollution. This purpose shall apply to all sources of air pollution, except those existing prior to the establishment of the Department, and to all air pollution, except those existing prior to the establishment of the Department.

The purpose and intent of this chapter is to protect the health of the people of the state by preventing, controlling, and abating air pollution. This purpose shall apply to all sources of air pollution, except those existing prior to the establishment of the Department, and to all air pollution, except those existing prior to the establishment of the Department.

The chapter is designed to achieve and maintain good results in the state by preventing, controlling, and abating air pollution. This purpose shall apply to all sources of air pollution, except those existing prior to the establishment of the Department, and to all air pollution, except those existing prior to the establishment of the Department.

17.802 Definitions. The following words and phrases shall have the meanings indicated by the following definitions:

(1) "Air pollution" means any condition of the atmosphere which is, or may be, injurious to the health of the people of the state, or which is, or may be, injurious to the environment.

(2) "Air pollution control" means any action taken by the state to prevent, control, or abate air pollution.

(3) "Ambient air" means the air which is not directly emitted from any source, and which is not directly emitted from any source, and which is not directly emitted from any source.

general term, "air pollution," as it applies to air pollution.

17.803 General Regulations. The following regulations shall apply to all sources of air pollution, except those existing prior to the establishment of the Department, and to all air pollution, except those existing prior to the establishment of the Department.

(1) "Pollution control" means any action taken by the state to prevent, control, or abate air pollution.

(2) "Air pollution control" means any action taken by the state to prevent, control, or abate air pollution.

(3) "Ambient air" means the air which is not directly emitted from any source, and which is not directly emitted from any source, and which is not directly emitted from any source.

(4) "Air pollution control" means any action taken by the state to prevent, control, or abate air pollution.

(5) "Air pollution control" means any action taken by the state to prevent, control, or abate air pollution.

(6) "Air pollution control" means any action taken by the state to prevent, control, or abate air pollution.

(7) "Air pollution control" means any action taken by the state to prevent, control, or abate air pollution.

(8) "Air pollution control" means any action taken by the state to prevent, control, or abate air pollution.

(9) "Air pollution control" means any action taken by the state to prevent, control, or abate air pollution.

(10) "Air pollution control" means any action taken by the state to prevent, control, or abate air pollution.

(11) "Air pollution control" means any action taken by the state to prevent, control, or abate air pollution.

(12) "Air pollution control" means any action taken by the state to prevent, control, or abate air pollution.

(13) "Air pollution control" means any action taken by the state to prevent, control, or abate air pollution.

RULES
OF
THE STATE OF FLORIDA
DEPARTMENT OF POLLUTION CONTROL
CHAPTER 17-2
AIR POLLUTION

- 17-2.01 Declaration and Intent
- 17-2.02 Definitions
- 17-2.03 General Restrictions
- 17-2.04 Prohibitive Acts
- 17-2.05 Ambient Air Quality Standards
- 17-2.06 Air Pollution Episode
- 17-2.07 Sampling and Testing
- 17-2.08 Local Regulations

17-2.01 Declaration and Intent. The State of Florida Department of Pollution Control promulgates this chapter to eliminate, prevent, and control air pollution. This chapter shall apply to all sources of air pollution except open burning or the use of outdoor heating devices allowed by chapter 17-5, Florida Administrative Code, unless otherwise provided in this chapter.

To protect and enhance the air quality of Florida, this chapter furthers the Department's nondegradation policy and establishes ambient air quality standards and emission standards. The policy inherent in the standards shall be to protect the air quality existing at the time the air quality standards were adopted or to upgrade or enhance the quality of the air of the State. In any event, where a new or increased source of air pollution poses a possibility of degrading existing high air quality or ambient air quality established by this chapter, such source or proposed source shall not be issued a Department permit until the Department has reasonable assurance that such source construction or development will not violate this chapter.

This chapter is adopted to achieve and maintain such levels of air quality as will protect human health and safety, prevent injury to plant and animal life and property, foster the comfort and convenience of people, promote the economic and social development of this State and facilitate the enjoyment of the natural attractions of this State.

General Authority 403.061 FS. Law Implemented 403.021, 403.031, 403.061 FS. History—Revised 1-18-72.

17-2.02 Definitions. The following words and phrases when used in this chapter shall, unless context clearly indicates otherwise, have the following meanings:

(1) "Air pollutant" — Any matter found in the atmosphere other than oxygen, nitrogen, water vapor, carbon dioxide and the inert gases in natural concentrations.

(2) "Air Pollutant source" or "source" — Any source at, from, or by reasons of which there is emitted into the atmosphere any air pollutant(s).

(3) "Process weight" — The total weight of all materials introduced into any process. Solid fuels and recycled materials are included in the determination of process weights; but uncombined water, liquid and

gaseous fuels, combustion air or excess air are not included.

(4) "Standard conditions" — A gas temperature of 70 degrees fahrenheit and a gas pressure of 14.7 psia.

(5) "Existing source" — A source which is in existence, (except for reactivation of older plants) operating or under construction or has received a permit to construct prior to the effective date of this chapter.

(6) "New Source" — Any source other than an existing source. New source includes reactivating existing or older plants which have been shutdown for a period of more than one year.

(7) "Particulate matter" — Means any material, other than uncombined water, which exists in a finely divided form as a liquid or solid, as measured by the sampling methods approved by the Board.

(8) "Sulfuric Acid Plant" — Means any installation producing sulfuric acid by the contact process by burning elemental sulfur, alkylation acid, hydrogen sulfides, organic sulfides and mercaptans, or acid sludge.

(9) "Acid mist" — Means any size liquid drops of any acid including but not limited to sulfuric acid and sulfur trioxide, hydrochloric acid and nitric acid as measured by test methods approved by the Board.

(10) "Visible emission" — Means an emission greater than 5 percent opacity or 1/4 Ringelmann measured by standard methods.

(11) "Fugitive particulate" — Particulate matter which escapes and becomes airborne from unenclosed operations or which is emitted into the atmosphere without passing or being conducted through a flue pipe, stack or other structure designed for the purpose of emitting air pollutants into the atmosphere.

(12) "Air Pollution Episode" — An occurrence of elevated levels of pollutants in the atmosphere which require hasty and unusual abatement action.

(13) "Odor" — Means a sensation resulting from stimulation of the human olfactory organ.

(14) "Objectionable Odor" — Any odor present in the outdoor atmosphere which by itself or in combination with other odors, is or may be harmful or injurious to human health or welfare, which unreasonably interferes with the comfortable use and enjoyment of life or property, or which creates a nuisance.

(15) "Fossil fuel steam generators" — Furnaces and boilers which produce steam by combustion of oil, coal or gas of fossil origin.

(16) "Plant section" — A part of a plant consisting of one or more unit operations including auxiliary equipment which provides the complete processing of input (raw) materials to produce a

marketable product, including but not limited to, granular triple super phosphate, phosphoric acid, run-of-pile triple super phosphate and di-ammonium phosphate, or one or more unit operations including auxiliary equipment or structures which are used for the functions of, including but not limited to, storage, shipping, loading, unloading, or bagging.

(17) "Department" — Means the State of Florida Department of Pollution Control.

(18) "Director" — Means the Executive Director of the Department.

(19) "Volatile organic compounds" or "Organic solvents" — Are any compounds containing carbon and hydrogen or carbon and hydrogen in combination with any other element which has a vapor pressure of 1.5 pounds per square inch absolute (77.6 mm. Hg) or greater under actual storage conditions.

(20) "Portland cement plant" — Means any facility manufacturing Portland Cement by either the wet or dry process.

(21) "Nitric acid Plant" — Means any facility producing weak nitric acid by either the pressure or atmospheric pressure process.

(22) "Kraft Pulp Mill" — Means an industrial operation which processes wood to produce cellulose or cellulose materials by means of chemically cooking the wood with a liquor consisting of an alkaline sulfide solution containing sodium hydroxide and sodium sulfide, also known as the sulfate process.

(23) "Bark boilers" — Means a part of the process of a kraft pulp mill, a furnace which produces steam using wood bark, either continuously or intermittently along with fossil fuels.

(24) "Sulfur Recovery Plant" — Any plant that recovers sulfur from crude (unrefined) petroleum materials.

(25) "Ringelmann Chart" — Means the chart published and described in the U.S. Bureau of Mines Information Circulars No. 8333 and No. 7718.

(26) "Stagnant atmospheric condition" — Denotes when the atmospheric and meteorological conditions will reduce the necessary diffusion and dispersment of air pollutants in the atmosphere.

(27) "Opacity" — Means a state which renders material partially or wholly impervious to rays of light causing obstruction of observer's view.

General Authority 403.061 FS. Law Implemented 403.021, 403.031, 403.061 FS. History—Revised 1-18-72.

17-2.03 General Restrictions.

(1) Latest Technology — If the latest reasonably available technology as may be applied to air pollutant sources results in or is expected to result in lower or improved air pollutant emissions, then the latest available technology as determined by the Department shall apply.

(2) Existing Source Compliance — Except where compliance dates are specified, existing sources shall comply with this chapter as expeditiously as possible but in no case later than July 1, 1975.

(3) Operation Rates — No plant or source shall operate at capacities which exceed the limits of operation of a control device or exceed the capability of the plant or control device to maintain the air

emission within the standard limitation imposed by this chapter, or by permit conditions.

(4)

(a) Air Quality Standards Violated — No person shall build, erect, construct, or implant any new source or operate, modify or rebuild an existing source or by any other means release or take action which would result in release of air pollutants into the atmosphere of any region, which will, as determined by the Board, result in, including concentrations of existing air pollutants, ambient air concentrations greater than ambient air quality standards.

(b) Nondegradation — In those counties of the State which have, on the effective date of this chapter, better air quality than that defined by the Ambient Air Quality Standards, no person shall emit into the atmosphere any air pollutant which degrades that quality.

(5) Concealment — No person shall build, erect, install or use any article, machine, equipment or other contrivance, the use of which will conceal an emission which would otherwise constitute a violation of any of the provisions of this chapter.

(6) Circumvention — No person shall circumvent any air pollution control device, or allow the emission of air pollutants without the applicable air pollution control device operation properly.

(7) Maintenance — All air pollution control devices and systems shall be properly and consistently maintained in order to maintain emissions in compliance with Department Rules.

General Authority 403.061 FS. Law Implemented 403.021, 403.031, 403.061 FS. History—Revised 1-18-72.

17-2.04 Prohibitive Acts.

(1) Visible Emissions — No person shall cause, let, permit, suffer or allow to be discharged into the atmosphere any air pollutants from:

(a) Existing Sources, until July 1, 1975, the density of which is equal to or greater than that designated as Number 2 on the Ringelmann Chart or the opacity of which is equal to or greater than 40 percent.

(b) New Sources, and after July 1, 1975, existing sources, the density of which is equal to or greater than that designated as Number 1 on the Ringelmann Chart or the opacity of which is equal to or greater than 20 percent.

(c) This subsection 17-2.04(1) does not apply to emissions emitted in accordance with specified emission limiting standards or in accordance with the process weight table (Table I) provided in this chapter.

(d) If the presence of uncombined water is the only reason for failure to meet visible emission standards given in this section such failure shall not be a violation of this rule.

(2) Particulate Matter — No person shall cause, let, permit, suffer, or allow the emission of particulate matter from any air pollutant source in total quantities in excess of the amount shown in Table I, except as otherwise provided for in this chapter for specific emission limiting standards of particulate matter from specified sources.

PROCESS WEIGHT TABLE
TABLE I

Process Weight Rate (pounds per hour)	Emission rate (pounds per hour)
50	0.03
100	0.55
500	1.53
1,000	2.25
5,000	6.34
10,000	9.73
20,000	14.99
60,000	29.60
80,000	31.19
120,000	33.28
160,000	34.85
200,000	36.11
400,000	40.35
1,000,000	46.72

Interpolation of the data in Table I for the process weight rates up to 60,000 pounds per hour shall be accomplished by the use of the equation: $E = 3.59P^{0.62}$, P less than or equal to 30 tons per hour and interpolation and extrapolation of the data for process weight rates in excess of 60,000 pounds per day shall be accomplished by use of the equation: $E = 17.31P^{0.16}$, P is greater than 30 tons per hour. Where: E = Emissions in pounds per hour. P = Process weight rate in tons per hour. Application of mass emission limitations on the basis of all similar units at a plant is recommended in order to avoid unequal application of this type of limitation to plants with the same total emission potential but different size units. Upon establishing the total mass limitation, individual source emissions will be determined by prorating the mass emission total on the basis of the percentage weight input to each source process.

(3) Fugitive Particulate — No person shall cause, let, permit, suffer or allow the emissions of particulate matter, from any source whatsoever, including but not limited to vehicular movement, transportation of materials, construction, alteration, demolition or wrecking, or industrially related activities such as loading, unloading, storing or handling, without taking reasonable precautions to prevent such emission, except particulate matter emitted in accordance with the weight process table (Table I), the visible emissions standards or specific source limiting standards specified in this chapter.

(4) Objectionable Odor Prohibited — No person shall cause, suffer, allow or permit the discharge of air pollutants which cause or contribute to an objectionable odor.

(5) Volatile organic compounds emissions or organic solvents emissions.

(a) No person shall store, pump, handle, process, load, unload or use in any process or installation volatile organic compounds or organic solvents without applying known and existing vapor emission control devices or systems deemed necessary and ordered by the Department.

(b) All persons shall use reasonable care to avoid discharging, leaking, spilling, seeping, pouring, or dumping volatile organic compounds or organic solvents.

(6) Stationary sources — No person shall cause, let, permit, suffer, or allow to be discharged into the atmosphere emission from the following listed sources greater than any emission limiting standard given.

(a) Incinerators

1. The emission limiting standards for new incinerators with a charging rate of fifty or more tons per day are:

a. Particulate matter — 0.08 grains per standard cubic foot dry gas corrected to 50 percent excess air.

b. Odor — there shall be no objectionable odor.

2. The emission limiting standards for new incinerators with a charging rate of less than fifty tons per day are:

a. Visible emissions — no visible emissions except, visible emissions are allowable for up to three minutes in any hour at densities up to but not more than, a density of Ringelmann Number 1. (Opacity of 20 percent)

b. Odor — there shall be no objectionable odor.

3. As soon as possible, but not later than July 1, 1975, existing incinerators shall comply with the standards for new incinerators except that the particulate matter emission limiting standard for existing incinerators with a charging rate of fifty or more tons per day shall be 0.1 grains per standard cubic foot of dry gas corrected to 50 percent excess air.

(b) Sulfuric Acid Plants — the emission limiting standards for sulfuric acid plants are:

1. Existing Plants

a. Sulfur dioxide (SO_2) — ten pounds of SO_2 per ton of 100 percent H_2SO_4 produced, as expeditiously as possible but not later than July 1, 1975.

b. A plume with visibility of 5 percent opacity (equivalent to 1/4 Ringelmann Number), except for 30 minutes during plant startup periods with opacity allowed up to 40 percent (equivalent to Ringelmann Number 2)

2. New Plants

a. Sulfur dioxide — four pounds of SO_2 per ton of 100 percent H_2SO_4 produced.

b. Acid Mist — 0.15 pounds per ton of 100 percent acid produced.

c. No visible emission except for 30 minute period during startup, but no greater than the opacity of 40 percent (equivalent to Ringelmann Number 2)

(c) Phosphate Processing — the emission limiting standards for phosphate processing are:

1. Fluorides (water soluble or gaseous-atomic weight 19) the following quantities expressed as pounds of fluoride per ton of phosphatic materials input to the system, expressed as tons of P_2O_5 for:

a. New plants or plant sections:

a1. Wet process phosphoric acid production, and auxiliary equipment — 0.02 pounds of F per ton of P_2O_5 .

a2. Run of pile triple super phosphate mixing belt and den and auxiliary equipment — 0.05 pounds of F per ton of P_2O_5 .

a3. Run of pile triple super phosphate curing or storage process and auxiliary equipment — 0.12 pounds of F per ton of P_2O_5 .

a4. Granular triple super phosphate production and auxiliary equipment.

i. Granular triple super phosphate made by granulating run-of-pile triple super phosphate — 0.06 pounds of F per ton of P_2O_5 .

ii. Granular triple super phosphate made from phosphoric acid and phosphate rock slurry — 0.15 pounds of F per ton of P_2O_5 .

a5. Granular triple super phosphate storage, and auxiliary equipment — 0.05 pounds of F per ton P_2O_5 .

a6. Diammonium phosphate production and auxiliary equipment — 0.06 pounds of F per ton of P_2O_5 .

a7. Calcining or other thermal phosphate rock processing and auxiliary equipment excepting phosphate rock drying and defluorinating — 0.05 pounds of F per ton of P_2O_5 .

a8. Defluorinating phosphate rock by thermal processing and auxiliary equipment — 0.37 pounds of F per ton of P_2O_5 .

a9. All plants, plant sections or unit operations and auxiliary equipment not listed in a1 to a8 will comply with best technology pursuant to Section 2.03(1) of this rule.

b. Existing plants or plant sections. Emissions shall comply with above section, 17-2.04 (6)(c) 1.a., for existing plants as expeditiously as possible but not later than July 1, 1975 or

b1. Where a plant complex exists with an operating wet process phosphoric acid section (including any items 17-2.04(6)(c) 1., a., a.1. through a.6. above) and other plant sections processing or handling phosphoric acid or products or phosphoric acid processing, the total emission of the entire complex may not exceed 0.4 pounds of F per ton of P_2O_5 input to the wet process phosphoric acid section.

b2. For the individual plant sections included in 17-2.04(6)(c) 1., a., a.1., through a.6. above but not included as a part as defined in 17-2.04(6)(c) 1., b., b.1. above, if it can be shown by comprehensive engineering study and report to the Department that the existing plant sections are not suitable for the application of existing technology, which may include major rebuilding or repairs and scrubber installations, the emission limiting standard to apply will be the lowest obtained by any similar plant section existing and operating.

(d) Kraft (sulfate liquor) Pulp Mills

1. Black liquor recovery furnace. The emission limiting standards are:

a. Particulate matter — existing sources as expeditiously as possible, but not later than July 1, 1975, no greater than three pounds particulate per each 3,000 pounds black liquor solids fed. For new sources the same emission limiting standards apply.

b. Total Reduced Sulfur — existing plants as expeditiously as possible, but not later than July 1, 1975 — 17.5 ppm expressed as H_2S on a dry gas basis, or one-half (0.5) pounds per 3,000 pounds of black liquor solids fed, whichever is more restrictive. For new plants no greater than 1 ppm expressed as H_2S on the dry basis, or 0.03 pounds per 3,000 pounds of black liquor solids fed, whichever is the more restrictive.

(e) Fossil Fuel Steam Generators — The emission limiting standards for Fossil Fuel Steam Generators are:

1. New Sources — plants with more than 250 million BTU per hour heat input.

a. Particulate matter — 0.1 pounds per million BTU heat input, maximum 2 hour average.

b. Visible emissions — the density of which is equal to or greater than Number 1 of the Ringelmann Chart (20 percent opacity) except that a shade as dark as Number 2 of the Ringelmann Chart (40 percent opacity) shall be permissible for not more than 2 minutes in any hour.

c. Sulfur dioxide — 0.8 pounds per million BTU heat input, maximum 2 hour average, when liquid fuel is burned.

d. Sulfur dioxide — 1.2 pounds per million BTU heat input, maximum 2 hour average, when solid fuel is burned.

e. Nitrogen oxides — 0.20 pounds per million BTU heat input maximum 2 hour average, expressed as NO_2 when gaseous fuel is burned.

f. Nitrogen oxides — 0.30 pounds per million BTU heat input, maximum 2 hour average, expressed as NO_2 when liquid fuel is burned.

g. Nitrogen oxides — 0.70 pounds per million BTU heat input, maximum 2 hour average, expressed as NO_2 when solid fuel is burned.

2. Existing Sources — plants with more than 250 million BTU per hour heat input.

a. Particulate no greater than the standard for new sources.

b. Visible emissions — no greater than the standard for new sources.

c. Sulfur dioxide — of 1.1 pounds per million BTU heat input when liquid fuel is burned, as expeditiously as possible but not later than July 1, 1975.

d. Sulfur dioxide of 1.5 pounds per million BTU heat input when solid fuel is burned as expeditiously as possible but no later than July 1, 1975.

e. Nitrogen oxides no greater than the standards for new sources as expeditiously as possible but no later than July 1, 1975.

3. New and existing plants with 250 million or less BTU per hour heat input.

a. Visible emissions standards as set forth in item 17-2.04(6)(e) 1.b. of this section.

b. Particulate matter, sulfur dioxide and nitrogen oxides apply 17-2.03(1) latest technology.

(f) Portland Cement Plants — the emission limiting standards for Portland Cement Plants are:

1. Existing and new sources.

a. For Kilns — particulate shall be not greater than allowed by the Process Weight Table, Table I, set forth in 17-2.04(2). The table shall be applied to each individual source rather than being applied on the basis of mass emission limitations.

b. For clinker-coolers the emission limiting standard of 17-2.04(6)(f) 1.a. above apply.

(g) Nitric Acid Plants — the emission limiting standards for nitric acid plants producing weak nitric acid (50-70 percent) by pressure or atmospheric pressure process are:

1. New plants

a. Nitrogen oxides no greater than 3 pounds per ton of acid produced (100 percent basis)

b. Visible emissions — none permitted.

2. Existing plants shall comply with the standard as expeditiously as possible but no later than July 1, 1975.

(h) Sulfur Recovery Plants — the emission limiting standards for sulfur recovery plants recovering sulfur from crude oil gas are:

1. New Plant

a. Sulfur oxides calculated as sulfur dioxide — no greater than 0.004 pounds of SO₂ per pound of sulfur input to the recovery system or no greater than 0.004 pounds of SO₂ per pound of sulfur removed from an oil well.

2. Existing Plants

a. Sulfur oxides calculated as sulfur dioxide no greater than (h) 1.a. of this section above as expeditiously as possible but no later than July 1, 1975.

(7) Mobile Sources

(a) No person shall cause, let, permit, suffer or allow the emission of smoke from motor vehicles on public roadways which is visible within the proximity of the engine exhaust outlet for a period of more than five (5) seconds.

1. Definitions — apply to this paragraph 17-2.04(7)(a) only

a. Smoke is defined as small gasborne and airborne particles, exclusive of water vapor, from a process of combustion, in sufficient number to be observable.

b. Motor vehicle is defined as any device powered by an internal combustion engine and on or in which any person or property may be transported.

2. Exception — all 2 cycle gasoline engines manufactured prior to the year 1976.

General Authority 403.061 FS. Law Implemented 403.021, 403.031, 403.061 FS. History—Revised 1-18-72.

17-2.05 Ambient Air Quality Standards.

(1) The air quality of the State's atmosphere is determined by the presence of specific pollutants in certain concentrations. Human health and welfare is affected and known or anticipated adverse results are produced by the presence of pollutants in excess of the certain concentrations. It is, therefore, established that maximum limiting levels, Ambient Air Quality Standards, of pollutants existing in the ambient air are necessary to protect human health and public welfare. The following statewide Ambient Air Quality Standards are established for Florida:

(a) Sulfur Dioxide

1. 60 micrograms per cubic meter (0.02 ppm) — annual arithmetic mean.

2. 260 micrograms per cubic meter (0.1 ppm) maximum 24 hour concentration, not to be exceeded more than once per year.

3. 1300 micrograms per cubic meter (0.5 ppm) maximum 3 hour concentration, not to be exceeded more than once per year.

(b) Particulate Matter

1. 60 micrograms per cubic meter — annual geometric mean.

2. 150 micrograms per cubic meter — maximum 24 hour concentration, not to be exceeded more than once per year.

(c) Carbon Monoxide

1. 10 milligrams per cubic meter (9 ppm) — maximum 8 hour concentration, not to be exceeded more than once per year

2. 40 milligrams per cubic meter (35 ppm) — maximum 1 hour concentration, not to be exceeded more than once per year.

(d) Photochemical Oxidants — measured and corrected for interference due to nitrogen oxides and sulfur dioxide.

1. 160 micrograms per cubic meter (0.08 ppm) — maximum 1 hour concentration, not to be exceeded more than once per year.

(e) Hydrocarbons — For use as a guide in devising implementation plans to achieve oxidant standards. To be measured and corrected for methane.

1. 160 micrograms per cubic meter (0.24 ppm) maximum 3 hour concentration (6 to 9 a.m.) not to be exceeded more than once per year.

(f) Nitrogen Dioxide

1. 100 micrograms per cubic meter (0.05 ppm) annual arithmetic mean.

(2) Exception — in Dade, Broward, and Palm Beach County, the above Ambient Air Quality Standards apply except as provided differently below:

(a) Sulfur Dioxide

1. 8.6 micrograms per cubic meter (0.003 ppm) — annual arithmetic mean.

2. 28.6 micrograms per cubic meter (0.010 ppm) — 24 hour concentration.

3. 57.2 micrograms per cubic meter (0.020 ppm) — maximum four hour concentration.

4. 286 micrograms per cubic meter (0.100 ppm) — maximum one hour concentration.

(b) Suspended Particulates

1. 50 micrograms per cubic meter — annual geometric mean.

2. 180 micrograms per cubic meter — maximum 24 hour concentration.

(c) Carbon Monoxide

1. 9 milligrams per cubic meter (8 ppm) — maximum 3 hour concentration.

2. 14 milligrams per cubic meter (12 ppm) — maximum 1 hour concentration.

(3) Sampling and analyses of contaminants in this section shall be performed by the methods approved by the Board.

(4) Abatement — a determination that any of the above standards, 17-2.05(1), has been exceeded, shall be adequate evidence for the Department to commence an investigation to determine the cause and to execute appropriate remedial measures.

General Authority 403.061 FS. Law Implemented 403.021, 403.031, 403.061 FS. History—Revised 1-18-72.

17-2.06 Air Pollution Episode

An episode describes a condition which exists when meteorological conditions and rates of discharge of air pollutants combine to produce pollutant levels in the atmosphere which, if sustained, can lead to a substantial threat to the health of the people. In order to prevent episode conditions from continuing or from developing into more severe conditions, positive action and a rapid abatement response is necessary. The severity of an episode has been classified upon the basis of the criteria given in

the following sections with the three levels, alert, warning and emergency described.

(1) Due to the exigent nature of named episodes the Director shall determine and declare that an air pollution episode exists. His determination shall be in accordance with the following criteria:

(a) Air Pollution Forecast — the existence or forecast of a stagnant atmospheric condition as advised by a National Weather Service advisory is in effect or an equivalent state or local determination of a stagnant condition.

(b) "Alert" — the alert level is that concentration of pollutants at which first stage control actions are to begin. An "alert" shall be declared when any one of the following levels is reached at any monitoring site:

1. Sulfur Dioxide (SO_2) — 800 micrograms per cubic meter (0.3 ppm) 24 hour average.

2. Particulate — 3.0 COH_3 or 375 micrograms per cubic meter, 24 hour average.⁵

3. Sulfur Dioxide (SO_2) and Particulate combined — product of SO_2 ppm, 24 hour average, and COH_3 equal to 0.2 or product of SO_2 micrograms per cubic meter, 24 hour average and particulate micrograms per cubic meter, 24 hour average equal to 65×10^3 .

4. Carbon Monoxide (CO) — 17 milligrams per cubic meter (15 ppm), 8 hour average.

5. Oxidant (O_3) — 200 micrograms per cubic meter (0.1 ppm) 1 hour average.

6. Nitrogen Dioxide (NO_2) — 1130 micrograms per cubic meter (0.6 ppm), 1 hour average, 282 micrograms per cubic meter (0.15 ppm), 24 hour average, and meteorological conditions are such that pollutant concentrations can be expected to remain at the above levels for twelve (12) or more hours or increase unless control actions are taken.

(c) "Warning" — the warning level indicates that air quality is continuing to degrade and that additional control actions are necessary. A "warning" shall be declared when any one of the following levels is reached at any monitoring site:

1. Sulfur Dioxide (SO_2) — 1600 micrograms per cubic meter (0.6 ppm), 24 hour average.

2. Particulate — 5.0 COH_3 or 625 micrograms per cubic meter, 24 hour average.

3. Sulfur Dioxide (SO_2) and Particulate combined — product of SO_2 ppm, 24 hour average and COH_3 equal to 0.8 or product of SO_2 micrograms per cubic meter, 24 hour average and particulate micrograms per cubic meter, 24 hour average equal to 261×10^3 .

4. Carbon Monoxide (CO) — 34 milligrams per cubic meter (30 ppm), 8 hour average.

5. Oxidant (O_3) — 300 micrograms per cubic

meter (0.4 ppm) — 1 hour average.

6. Nitrogen Dioxide (NO_2) — 2260 microgram per cubic meter (1.2 ppm) — 1 hour average; 565 micrograms per cubic meter (0.3 ppm), 24 hour average, and meteorological conditions are such that pollutant concentrations can be expected to remain at the above levels for twelve (12) or more hours or increase unless control actions are taken.

(d) "Emergency" — the emergency level indicates that air quality is continuing to degrade to a level that should never be reached and that the most stringent control actions are necessary. An "emergency" shall be declared when any one of the following levels is reached at any monitoring site:

1. Sulfur Dioxide (SO_2) — 2,100 micrograms per cubic meter (0.8 ppm), 24 hour average.

2. Particulate — 7.0 COH_3 or 875 micrograms per cubic meter 24 hour average.

3. Sulfur Dioxide (SO_2) and Particulate combined — product of SO_2 ppm, 24 hour average and COH_3 equal to 1.2 or product of SO_2 micrograms per cubic meter, 24 hour average and particulate micrograms per cubic meter, 24 hour average equal to 393×10^3 .

4. Carbon Monoxide (CO) — 46 milligrams per cubic meter (40 ppm), 8 hour average.

5. Oxidant (O_3) — 1,200 micrograms per cubic meter (0.6 ppm), 1 hour average.

6. Nitrogen Dioxide (NO_2) — 3,000 micrograms per cubic meter (1.6 ppm), 1 hour average; 750 micrograms per cubic meter (0.4 ppm), 24 hour average, and meteorological conditions are such that pollutant concentrations can be expected to remain at the above levels for twelve (12) or more hours.

(e) Area of Episode. The Director shall, when declaring any episode level, declare the counties in which the episode exists.

(f) "Termination" — once declared, any episode level will remain in effect until the pollutant concentration increases to meet the next higher level criteria or decreases to a point below the declared criteria level.

(2)

(a) Emission Reduction Plans and Actions.

Upon a declaration by the Director that any episode level exist—alert, warning, or emergency—any person responsible for the operation or conduct of activities which result in emission of air pollutants shall take actions as required for such source or activity for the declared episode level as set forth in Episode Tables I, II, and III of this section and shall put into effect the Preplanned Abatement Strategy.

EPISODE TABLE I

Alert Level Emission Reduction Plans

Part A. General

During an "alert" level episode:

1. All forms of open burning are prohibited.
2. The use of incinerators for disposal of any form of solid waste or liquid waste is prohibited.
3. Persons operating fuel-burning equipment which requires boiler lancing or soot blowing shall perform such operations only between the hours of 12 noon and 4 p.m.
4. Persons operating motor vehicles should eliminate all unnecessary operations.

Part B. Source Curtailment

During an alert level episode any persons responsible for the operation of a source of air pollutants listed below shall take all required control actions for this alert level:

Source of Air Pollution

1. Coal or oil-fired electric power generating facilities.

Required Control Action

- a. Substantial reduction by utilization of fuels having low ash or sulfur content.
- b. Maximum utilization of mid-day (12 noon to 4 p.m.) atmospheric turbulence for boiler lancing and soot blowing.
- c. Substantial reduction by diverting electric power generation to facilities outside of alert area.

2. Process steam generating facilities which fire coal or oil.

- a. Substantial reduction by utilization of fuels having low ash and sulfur content.
- b. Maximum utilization of mid-day (12 noon to 4 p.m.) atmospheric turbulence of boiler lancing and soot blowing.
- c. Substantial reduction of steam demands consistent with continuing plant operations.

3. Process steam generating facilities which fire wood, bark, or bagasse; totally or in combination with other fuels.

- a. Substantial reduction by switching to fossil fuels with low ash and sulfur content or by diverting steam demands to steam generators utilizing low ash and sulfur content fuels.
- b. Maximum utilization of mid-day (12 noon to 4 p.m.) atmospheric turbulence for boiler lancing and soot blowing.
- c. Substantial reduction of steam demands consistent with continuing plant operations.

4. Manufacturing industries of the following classifications:

Pulp and paper industries
Citrus industries
Mineral Processing industries
Phosphate and allied chemical industries
Secondary metal industry
Petroleum operations

- a. Substantial reduction of air pollutants from manufacturing operations by enacting preplanned abatement strategies including curtailing postponing or deferring production and all operations.
- b. Curtail trade waste disposal operations which emit air pollutants.

5. Bulk handling operations which transfer or store material including but not limited to:

Cement
Fertilizer
Phosphate rock
Grain or Feed
ROP Triple Super Phosphate Lime
Sand and Gravel
Dolomite

- a. Maximum reduction of fugitive dust by curtailing, postponing or deferring bulk handling operations.

6. Any other industrial or commercial establishments which emit air pollutants.

- a. Substantial reduction of air pollutants by curtailing, postponing, or deferring operations.
- b. Curtail trade waste disposal operations which emit air pollutants

EPISODE TABLE II

Warning Level Emission Reduction Plans

Part A. General

During a "Warning" level episode:

1. All forms of open burning are prohibited.
2. The use of incinerators for disposal of any form of solid waste or liquid waste is prohibited.
3. Persons operating fuel burning equipment which requires boiler lancing or soot blowing shall perform such operations only between the hours of 12 noon and 4 p.m.
4. Persons operating motor vehicles must reduce operations by the use of car pools and increased use of public transportation and elimination of unnecessary operation.
5. Unnecessary space heating or cooling is prohibited.

Part B. Source Curtailment During a warning level episode any persons responsible for the operation of a source of air pollutants listed below shall take all required control actions for this warning level:

Source of Air Pollution

1. Coal or oil-fired electric power generating facilities.

Required Control Action

- a. Maximum reduction by utilization of fuels having lowest ash and sulfur content.
- b. Maximum utilization of mid-day (12 noon to 4 p.m.) atmospheric turbulence for boiler lancing and soot blowing.
- c. Maximum reduction by diverting electric power generation to facilities outside of warning area or to generating stations emitting less pollutants per kilowatt generated.

2. Process steam generating facilities which fire oil or coal.

- a. Maximum reduction by utilization of fuels having the lowest available ash and sulfur content.
- b. Maximum utilization of mid-day (12 noon to 4 p.m.) atmospheric turbulence for boiler lancing and soot blowing.
- c. Stand-by to enact preplanned emergency action plan.

3. Process steam generating facilities which fire wood, bark or bagasse.

- a. Maximum reduction by reducing heat and steam demands to absolute necessities consistent with preventing equipment damage.
- b. Maximum utilization of mid-day (12 noon to 4 p.m.) atmospheric turbulence for boiler lancing and soot blowing.

4. Manufacturing industries of the following classifications:

Pulp and paper industries
Citrus industries
Mineral processing industries
Phosphate and allied chemical industries
Secondary metal industry
Petroleum operations

- a. Commence preplanned abatement strategies for the elimination of all air pollutants.
- b. Elimination of air pollutants from trade waste disposal operations which emit air pollutants.

5. Bulk handling operations which transfer or store material including but not limited to:

Fertilizer
Phosphate Rock
Grain or Feed
ROP Triple Super Phosphate
Cement
Lime
Sand and Gravel
Dolomite

- a. Elimination of fugitive dust by ceasing, curtailing, postponing or deferring transfer or storage of material.

6. Any other industrial or commercial establishments which emit air pollutants.

- a. Maximum reduction by curtailing, postponing or deferring operations.
- b. Eliminate trade waste disposal operations which emit air pollutants.

EPISODE TABLE III

Emergency Level Emission Reduction Plans

Part A. General

During an "emergency" level episode:

1. All forms of open burning are prohibited.
2. The use of incinerators for disposal of any form of solid or liquid waste is prohibited.
3. All places of employment described below shall immediately cease operations.
 - a. Mining and quarrying of nonmetallic minerals.
 - b. All construction work except that which must proceed to avoid emergent physical harm.
 - c. All manufacturing establishments except those required to have in force an air pollution emergency plan.
 - d. All wholesale trade establishments; i.e., places of business primarily engaged in selling merchandise to retailer, or industrial, commercial, institutional or professional users, or to other wholesalers, or acting as agents in buying merchandise for or selling merchandise to such persons or companies, except those engaged in the distribution of drugs, surgical supplies and food.
 - e. All offices of local, county and State government including authorities, joint meeting, and other public bodies excepting such agencies which are determined by the chief administrative officer of local, county, or State government, authorities, joint meetings and other public bodies to be vital for public safety and welfare and the enforcement of the provisions of this order.
 - f. All retail trade establishments except pharmacies, surgical supply distributors, and stores primarily engaged in the sale of food.
 - g. Banks, credit agencies other than banks, securities and commodities brokers, dealers, exchanges and services, offices of insurance carriers, agents and brokers, real estate offices.
 - h. Wholesale and retail laundries, laundry services and cleaning and dyeing establishments; photographic studios; beauty shops, barber shops, shoe repair shops.
 - i. Advertising offices; consumer credit reporting, adjustment and collection agencies; duplicating, addressing, blueprinting; photocopying, mailing, mailing list and stenographic services; equipment rental services, commercial testing laboratories.
 - j. Automobile repair, automobile services, garages.
 - k. Establishments rendering amusement and recreational services including motion picture theaters.
 - l. Elementary and secondary schools, colleges, universities, professional schools, junior colleges, vocational schools, and public and private libraries.
4. All commercial and manufacturing establishments not included in this section will institute such actions as will result in maximum reduction of air pollutants from their operation by ceasing, curtailing or postponing operations which emit air pollutants to the extent possible without causing injury to person or damage to equipment.
5. The use of motor vehicles is prohibited except in emergencies with the approval of local or state police.
6. Unnecessary lighting, heating or cooling in unoccupied structures is prohibited.

Part B. Source Curtailment

During an emergency level episode any persons responsible for the operation of a source of air pollutant listed below shall take all required action for this emergency level.

Source of Air Pollution

1. Coal or oil-fired electric power generating facilities.

Required Control Action

- a. Maximum reduction by utilization of fuels having lowest ash and sulfur content.
- b. Maximum utilization of mid-day (12 noon to 4 p.m.) atmospheric turbulence for boiler lancing or soot blowing.
- c. Maximum reduction by diverting electric power generation to facilities outside of emergency area or to generating stations emitting less pollutants per kilowatt generated.

2. Coal, oil, natural gas, wood, bark and bagasse — fired process steam generating facilities.

- a. Maximum reduction by reducing heat and steam demands to absolute necessities consistent with preventing equipment damage.
- b. Maximum utilization of mid-day (12 noon to 4 p.m.) atmospheric turbulence for boiler lancing or soot blowing.
- c. Taking the action called for in preplanned emergency action plan.

3. Manufacturing industries of the following classifications:

Pulp and paper industries
Citrus industries

- a. Continuation of preplanned abatement strategies for the elimination of air pollutants.
- b. Elimination of air pollutants from trade waste disposal operations which emit air pollutants.

Mineral processing industries
 Phosphate and allied chemical industries
 Secondary metal industries
 Petroleum operations

4. Bulk handling operations which transfer or store material including but not limited to:

Cement
 Fertilizer
 Phosphate Rock
 Grain
 ROP Triple Super Phosphate
 Lime
 Sand and Gravel
 Dolomite

5. Any other industrial or commercial establishments which emit air pollutants.

a. Elimination of fugitive dust by ceasing, curtailing, postponing or deferring transfer or storage of material.

a. Elimination of air pollutants by ceasing, curtailing, postponing or deferring operations.
 b. Elimination of air pollutants from trade waste disposal process which emit air pollutants.

(b) Preplanned Abatement Strategies — any person responsible for one or more air pollutant sources shall prepare and submit, upon written request from the Department, a stand-by plan which describes the action which will be taken by that person to reduce emissions when an episode is declared. The plan shall be submitted within 30 days of the request and will be subject to approval, modification or rejection by the Department. The plan shall be in writing and shall include but not be limited to:

1. Identity and location of pollutant sources and of contaminants discharged.
2. Approximate amount of normal emission and of reduction of emission expected.
3. A brief description of the manner in which reduction will be achieved, for each of the episode levels, alert, warning and emergency.

(c) Whenever during an episode (alert, warning, or emergency) any person responsible for the operation of a source or conduct of activities which result in emission of air pollutants does not take actions as required for the source or activity for the declared episode level or put into effect the Preplanned Abatement Strategy, the Director shall immediately institute proceedings in a court of competent jurisdiction for injunctive relief to enforce this chapter.

General Authority 403.061 FS. Law Implemented 403.021, 403.031, 403.061 FS. History—Revised 1-18-72.

17-2.07 Sampling and Testing.

(1) All persons shall, upon request of the Department, provide continuous automatic monitoring testing and records of contaminants being emitted from a source.

(2) All persons shall provide facilities for continuously determining the input process weight or input heat when such factors are the basis for limiting standards.

(3) A person responsible for the emission of air pollutants from any source shall, upon request of the Department provide in connection with such sources and related source operations, such sampling and testing facilities exclusive of instruments and sensing devices as may be necessary for the proper

determination of the nature and quantity of air pollutants which are, or may be emitted as a result of such operation.

(4) Such facilities may be either permanent or temporary at the discretion of the person responsible for their provision and shall be suitable for the use of methods and equipment acceptable to the Department, who shall indicate in writing the required size, number and location of sampling holes; the size and location of the sampling platform; and the utilities for operating the sampling and testing equipment. The facilities shall comply with all applicable laws and regulations concerning safe construction and safe practice in connection with such facilities.

(5) When the Department upon investigations has good reason to believe that the provisions of this chapter concerning emission of pollutants are being violated, it may require the person responsible for the source of pollutants to conduct tests which will identify the nature and quantity of pollutant emissions from the source and to provide the results of said tests to the Department. These tests shall be carried out under the supervision of the Department, and at the expense of the person responsible for the source of pollutants.

(6) All analyses and tests shall be conducted in a manner specified by the Department. Results of analyses and tests shall be calculated and reported in a manner specified by the Department.

(7) Analyses and tests for compliance may be performed by the Department at the cost of the person responsible for the emission of air pollutants.

General Authority 403.061, 403.101 FS. Law Implemented 403.021, 403.031, 403.061, 403.101 FS. History—Revised 1-18-72.

17-2.08 Local Regulations.

Regulations controlling air pollution may be adopted by local governmental authorities provided that such regulations shall not be in conflict herewith or that standards so adopted shall not be less stringent than those established herein.

General Authority 403.061, 403.182 FS. Law Implemented 403.021, 403.031, 403.061, 403.182 FS. History—Revised 1-18-72.

Preservation of Native Trees, Shrubs, and Vines (Rare Plant Law)

APPENDIX 5

An act relating to preservation of wild trees, shrubs, vines, flowers, ferns and mosses, amending section 405.01, Florida Statutes, providing exemptions, providing a penalty, repealing section 405.01 and 405.02, Florida Statutes, providing an effective date.

Enacted by the Legislature of the State of Florida: Section 1. Section 405.01, Florida Statutes, is amended to read: 405.01. Preservation of wild trees, shrubs and vines; penalties.

(1) It is unlawful for any person to:

- (a) wilfully pick, pull up, tear up, dig up, cut, break, remove or destroy trees, shrubs, vines, flowers, ferns and mosses which are designated as rare in paragraph (2) growing upon the land of another, or upon the land owned, leased, or controlled by the State as a public park, or as a game preserve, or sanctuary for trees, plants, wild animals, birds or fish, which are designated as rare in paragraph (2) for the purpose of selling or offering for sale, or for the purpose of exhibiting or for the purpose of making or causing to be made a collection of such trees, shrubs or vines;

State of Florida

- (b) Transport, carry or cause to be transported, by highway, or sell or offer for sale in any place.

Rare Plant Law

1. *Ericaceae*-all species of the Ericaceae family, common or rare in all places, or wild plants, native to the state except *Vaccinium corymbosum*, the common blueberry, which is specifically excluded from this law.
2. *Gramineae*-all species of the Gramineae family, common or rare in all places, native to the state.
3. *Fernae*-all species of the Fernae family, native to the state, except the following: all *Adiantum* (Maidenhair fern), *Polka fern* (Polka fern), *Polka fern* (Polka fern), and *Polka fern* (Polka fern) which are specifically excluded from this law.
4. *Palmae*-all species of the Palmae family native to the state, except the *Coconut palm* (Coccothrinax) which is specifically excluded from this law.
5. *Passiflorae*-all species native to the state.
6. *Sarraceniae*-all species native to the state (terrestrial plants).
7. *Malvaceae*-all species native to the state (common).

FLORIDA LAW, Chapter 65-426, section 865.06

Preservation of Native Trees, Shrubs, and Plants (Rare Plant Law)

An act relating to preservation of wild trees, shrubs, vines, flowers, ferns and mosses; amending section 865.06, Florida Statutes, providing exemptions; providing a penalty; repealing section 865.061 and 865.062, Florida Statutes; providing an effective date.

Be It Enacted by the Legislature of the State of Florida: Section 1. Section 865.06, Florida Statutes, is amended to read: 865.06. Preservation of wild trees, shrubs and plants; penalty--

(1) It is unlawful for any person to:

(a) Wilfully pick, pull up, tear up, dig up, cut, break, injure or destroy trees, shrubs, vines, flowers, ferns and mosses which are hereinafter named in paragraph (b) growing upon the land of another, or upon the land reserved, set aside or maintained by the state as a public park, or as a game preserve, or sanctuary for trees, plants, wild animals, birds or fish, without having previously obtained permission from the owner or person lawfully occupying such land or his representative of the superintendent or custodian of such park, refuge or sanctuary.

(b) Transport, carry or convey on any public highway, or sell or offer for sale in any place the following plants:

1. Bromeliads--all species of the bromeliad family, sometimes known as air plants, or wild pines, native to the state except *Tillandsia usneoides*, the Spanish moss, which is specifically excluded from this law.
2. Orchids--all species of the orchid family, both epiphytic and terrestrial, native to the state.
3. Ferns--all species of the fern families, native to the state, except the following: all *Acrostichum* (leather swamp fern), *Blechnum* (swamp fern), *Nephrolepis* (Boston fern), *Osmunda* (Cinnamon and royal fern), and *Polypodium*; *Dryopteris normalis*; *Dryopteris thelypteris* (marsh fern) and *Pteris cretica* (small bracken fern) which are specifically excluded from this law.
4. Palms--all species of the palm family native to the state, except the *Sabal palmetto* (cabbage palm) which is specifically excluded from this law.
5. *Peperomia*--all species native to the state;
6. *Sarracenia*--all species native to the state (pitcher plants);
7. *Zamia*--all species native to the state (coontie);

8. *Cercis canadensis* (redbud);
9. *Epigaea repens* (trailing arbutus);
10. *Erythrina arborea* (Cherokee or coral bean);
11. *Eugenia confusa* and *E. simpsonii* (redberry and Simpson eugenia)
12. *Gelsemium sempervirens* (yellow jasmine);
13. *Gordonia lasianthus* (loblolly-bay);
14. *Guaiacum sanctum* (roughbark lignum vitae);
15. *Guilandina crista* (nicker bean);
16. *Ilex cassine*, *I. myrtifolia* and *I. opaca* (dahoon, myrtle-leaved and American holly);
17. *Kalmia latifolia* (mountain laurel);
18. *Jacquinia keyensis* (joewood);
19. *Lobelia cardinalis* (cardinal flower);
20. *Nemastylis floridana* (celestial lily);
21. *Rhododendron austrinum* and *R. canescens* (wild azaleas);
22. *Pinckneya pubens* (fevertree);
23. *Salpingostylis coelestina* (Bartram's ixia);
24. *Sophora tomentosa* (necklace-pod);
25. *Taxus floridana* (Florida yew);
26. *Tetrazygia bicolor* (tetrazygia);
27. *Torreya taxifolia* (Florida torreya);
28. *Tournefortia gnaphalodes* (sea lavender);
29. *Viorna baldwinii* (dwarf clematis);
30. *Cornus florida* and *Cornus alternifolia* (dogwood);
which have been gathered, picked, pulled up, torn up, dug up,
cut or broken in violation of this law.

- (c) A review and possible revision of this list shall be made at ten (10) year intervals by a committee from the Florida federation of garden clubs, inc., and the Florida nurserymen and growers association, inc. to keep it up to date as changing conditions within the state decree.
- (2) (a) In any prosecution under this section it shall be a defense that plants, or the flowers, roots, bulbs or other parts thereof transported, carried or conveyed or sold or offered for sale by the party were grown under cultivation, or were taken from his own land or land under lease by him or were taken from the land of another with written permission by the other or his representative or were legally imported from another country.
- (b) Licensed, certified nurserymen who grow any of the native plants listed in paragraph (b) of subsection (1) from seeds or by vegetative propagation are specifically permitted to sell these commercially grown plants and shall not be in violation of this section of the law if they do so, as it is the intent of the law to preserve and encourage the growth of these native plants which are rapidly disappearing from the state.
- (3) Any person who wilfully does any act made unlawful under this section is guilty of a misdemeanor and shall be punished by imprisonment not exceeding thirty (30) days or by a fine of not less than twenty dollars (\$20.00), nor more than one hundred dollars (\$100.00) and costs.
- (a) Nothing in this section applies to public utility company duties or to authorized personnel of colleges and scientific institutions collecting for educational and scientific research purposes, or to persons engaged in the collection of limited amounts of seeds for propagation purposes.
- (b) All prosecutions under this section shall be commenced within six (6) months from the time such offense was committed and not afterwards.
- (4) Plant inspectors of the state department of agriculture shall, as part of their regular inspection of nurseries and roadside stands, be on the alert for any of the above native plants appearing suddenly in a given nursery in a mature stage or a stage showing several years of growth and are empowered to request proof of where and how the plants were obtained.

Section 2. Section 865.061, Florida Statutes, is repealed.

Section 3. This act shall take effect upon becoming law.

Became a law without the Governor's approval. Filed in Office Secretary of State June 25, 1965.

Vertebrates of the Osceola National Forest

Amphibians

Oak toad
Eastern narrow-mouthed toad
Piney woods tree frog
Little grass frog
Cricket frog
Leopard frog
Green frog
River frog
Mole salamander
Tiger salamander
Striped newt

Southern toad
Barking tree frog
Green tree frog
Spring peeper
Chorus frog
Bullfrog
Pig frog
Eastern spadefoot toad
Slimy salamander
Dusky salamander
Common newt

Reptiles

Gopher tortoise
Snapping turtle
Loggerhead musk turtle
Florida red-bellied turtle
Six-lined race runner
Southeastern five-lined skink
Eastern fence lizard
Florida worm lizard
American alligator
Black snake
Short-tailed snake
Pine snake
Rough earth snake
Yellow-lipped snake
Diamond-back rattlesnake
Canebrake rattlesnake
Rainbow snake

Box turtle
Spiny softshell
Stinkpot
Cooter
Florida red-tailed skink
Green anole
Eastern glass lizard
Broad headed skink
Indigo
Coachwhip snake
Yellow rat snake
Worm snake
Rough green snake
Coral snake
Pigmy rattlesnake
Mud snake
Cottonmouth moccasin

Birds

Bob-white
Parula warbler
Pine warbler
Summer tanager
Rufous-sided towhee
Tufted titmouse
Red-eyed vireo
Carolina chickadee
Brown thrasher
Brown-headed nuthatch

Blue-grey gnatcatcher
Cardinal
Common yellow throat
Eastern ground dove
Yellow-billed cuckoo
Florida wren
White-breasted nuthatch
White-eyed vireo
Blue-jay
Eastern meadowlark

Tree swallow
Boat-tailed grackle
Brewers blackbird
Fish crow
Palm warbler
Chuck-will's-widow
Hairy woodpecker
Red-cockaded woodpecker
Barred owl
Osprey
Red-tailed hawk
Turkey
Ring-necked duck
Blue-winged teal
White ibis
Common egret
Louisiana heron
Great Blue heron
Sparrow hawk
Peregrine falcon
American coot
Red-bellied woodpecker
Yellow-shafted flicker

Phoebe
Common grackle
Rusty blackbird
Common crow
Night hawk
Pileated woodpecker
Downy woodpecker
Belted kingfisher
Great horned owl
Red-shouldered hawk
Broad-winged hawk
Turkey vulture
Wood duck
Green-winged teal
Wood ibis
Cattle egret
Little blue heron
Pied-billed grebe
Pigeon hawk
Coopers hawk
Red-headed woodpecker
Yellow-bellied sapsucker
Eastern green heron

Mammals

Opossum
Eastern mole
Nine-banded armadillo
Flying squirrel
Fox squirrel
Shorttail shrew
Cotton mouse
Old field mouse
Black bear
River otter
Longtailed weasel
Florida panther
Florida deer mouse
Whitetail deer
Cotton rat

Least shrew
Florida yellow bat
Eastern cottontail
Grey squirrel
Southeastern pocket gopher
Rice rat
Eastern harvest mouse
Gray fox
Raccoon
Striped skunk
Eastern spotted skunk
Bobcat
Feral hog
Golden mouse

Fish

Longnose gar
Florida gar
Bowfin
American shad

Mosquitofish
Sailfin molly
Pirate perch
Okefenokee pigmy sunfish

Gizzard shad
Redfin pickerel
Chain pickerel
Redeye chub
Golden shiner
Ironcolor shiner
Dusky shiner
Taillight shiner
Sailfin shiner
Channel catfish
Yellow bullhead
Brown bullhead
Skeckled madtom
Golden topminnow
Starhead topminnow
Least killifish
Johnny darter
Blackbanded darter

Spotted sunfish
Dollar sunfish
Redear sunfish
Red breast sunfish
Warmouth
Flier
Blackbanded sunfish
Black crappie
Largemouth bass
Suwannee bass
American eel
Brook silverside
Tadpole madtom
Banded topminnow
Seminole killifish
Brown darter
Swamp darter
Bluegill

Table 4
Biography and Environment of Quarters in
Smart Region.

APPENDIX 7

	Land	Inland Water	Total
Florida	56,757.0	4,276.5	61,033.5
Smart Region	11,718.4	815.2	12,533.6
Alachua	273.7	75.2	348.9
Baker	234.6	5.4	240.0
Bartow	252.7	71.2	323.9
Brevard	1,887.0	85.8	1,972.8
Collier	224.7	12.5	237.2
Columbia	442.4	15.5	457.9
Dade	725.2	74.2	800.4
DeSoto	315.1	1.7	316.8
Duval	514.2	9.9	524.1
Escambia	546.7	22.3	569.0
Franklin	722.2	2.1	724.3
Gadsden	421.2	31.0	452.2
Hardee	778.2	129.2	907.4
Highway	274.7	75.2	349.9
Jefferson	422.2	1.2	423.4
Leon	1,256.2	1.2	1,257.4
Liberty	247.2	4.7	251.9

Socio-Economic Data by Counties

Source: Florida Statistical Abstract, 1977.

Table A
Geography and Environment of Counties in
Impact Region

	Area in Square Miles		
	<u>Land</u>	<u>Inland Water</u>	<u>Total</u>
Florida	54,136.0	4,424.0	58,560
Impact Region	11,239.4	416.6	11,656
Alachua	915.7	49.3	965
Baker	584.6	3.4	588
Bradford	293.7	7.3	301
Clay	593.0	51.0	644
Columbia	784.1	4.9	789
Dixie	692.4	16.6	709
Duval	765.7	74.3	840
Flagler	487.3	16.7	504
Gilchrist	346.3	1.7	348
Hamilton	514.2	0.8	515
Lafayette	548.7	2.3	551
Madison	702.9	5.1	708
Nassau	650.0	21.0	671
Putnam	778.7	100.3	879
St. Johns	604.7	55.3	660
Suwanee	685.8	1.2	687
Taylor	1,050.6	1.4	1,052
Union	241.0	4.0	245

Source: Florida Statistical Abstract, 1972.

Table B

Source: Florida Statistical Abstract, 1972

Population Change in Impact Region
By Counties, 1960 - 1970

	<u>1960</u>	<u>1970</u>	% Change
U.S.	179,325,369	203,165,699	13.3
South	24,845,395	28,636,357	15.3
Florida	4,951,560	6,789,443	37.1
Impact Region	739,174	877,847	18.8
Alachua	74,074	104,764	41.4
Baker	7,363	9,242	25.5
Bradford	12,446	14,625	17.5
Clay	19,535	32,059	64.1
Columbia	20,077	25,250	25.8
Dixie	4,479	5,480	22.3
Duval	455,411	528,865	16.1
Flagler	4,566	4,454	-2.5
Gilchrist	2,868	3,551	23.8
Hamilton	7,705	7,787	1.1
Lafayette	2,889	2,892	.1
Madison	14,154	13,481	-4.8
Nassau	17,189	20,626	20.0
Putnam	32,212	36,290	12.7
St. Johns	30,034	30,727	2.3
Suwannee	14,961	15,559	4.0
Taylor	13,168	13,641	3.6
Union	6,043	8,112	34.2

Table C
Population Projections for the Impact Region
By Counties, 1980

	<u>1970 Census</u>	<u>1980 Projection</u>
<u>Florida</u>	6,789,443	8,719,400
<u>Impact Region</u>	877,847	1,032,600
Alachua	104,764	135,000
Baker	9,242	10,700
Bradford	14,625	15,600
Clay	32,059	44,700
Columbia	25,250	32,500
Dixie	5,480	6,300
Duval	528,865	611,000
Flagler	4,454	5,700
Gilchrist	3,551	4,300
Hamilton	7,787	8,000
Lafayette	2,892	2,900
Madison	13,481	13,000
Nassau	20,626	24,500
Putnam	36,290	40,500
St. Johns	30,727	38,600
Suwanee	15,559	16,500
Taylor	13,641	14,100
Union	8,112	8,700

Source: Florida Statistical Abstract, 1972

Table D
Health Manpower and Facilities by Counties
in the
Impact Region

Source: Florida Statistical Abstract, 1972

	Hospital Beds		Active M.D.'s 1967	Manpower	
	Total No. Beds 1970	No. Beds 1000 Pop. 1970		Pharmacists 1966	Reg. Nurses 1966
Florida	33,098	4.59	8,235	3,579	21,091
Impact Region	3,667	4.17	1,236	411	2,272
Alachua	223	2.00	414	87	420
Baker	25	2.63	14	4	18
Bradford	54	3.62	7	4	26
Clay	60	1.72	18	7	50
Columbia	176	6.57	42	14	127
Dixie	0	.00	0	2	4
Duval	2,607	4.77	672	225	1,349
Flagler	60	12.77	3	3	10
Gilchrist	0	.00	1	1	3
Hamilton	25	3.20	2	3	8
Lafayette	0	.00	1	1	4
Madison	31	2.31	6	6	22
Nassau	55	2.56	7	8	27
Putnam	67	1.80	14	14	54
St. Johns	131	4.15	20	18	102
Suwannee	80	5.06	4	9	26
Taylor	48	3.50	8	3	17
Union	25	2.98	3	2	5

Table E

Public Assistance Payments to Recipients
 (All Programs) by Counties in the Impact Region for Month of
 February, 1972

Florida	\$12,916,000
Impact Region	2,409,000
Alachua	288,000
Baker	21,000
Bradford	51,000
Clay	46,000
Columbia	85,000
Dixie	20,000
Duval	1,388,000
Flagler	14,000
Gilchrist	14,000
Hamilton	30,000
Lafayette	8,000
Madison	78,000
Nassau	52,000
Putnam	136,000
St. Johns	71,000
Suwannee	45,000
Taylor	40,000
Union	22,000

Source: Florida Statistical Abstract, 1972

Table F

Average Typical Residential Electric Bills,
Southeastern States and United States, 1970

	1,000 Kilowatt Hours
United States	18.31
Alabama	14.91
Arkansas	17.23
Florida	19.10
Georgia	14.86
Kentucky	17.09
Louisiana	19.00
Mississippi	14.73
North Carolina	16.24
South Carolina	16.69
Tennessee	11.32
Virginia	17.03
W. Virginia	16.76

Source: Florida Statistical Abstract, 1972

Table G 1

Housing Information, By Counties in Impact Region

Impact Counties	No. Non-Farm Housing Units on April 1, 1970	No. Non-Farm Housing Unit Permits Authorized 1971
Alachua	22,322	3,572
Baker	855	15
Bradford	1,722	18
Clay	3,661	854
Columbia	3,792	67
Dixie	751	0
Duval	174,309	6,670
Flagler	1,159	84
Gilchrist	361	5
Hamilton	780	2
Lafayette	Not Available	
Madison	1,231	98
Nassau	2,579	44
Putnam	4,034	43
St. Johns	4,814	75
Suwannee	2,362	53
Taylor	2,680	23
Union	541	5

Source: Florida Statistical Abstract, 1972

Table H

Owner-Occupied Housing Units, By Counties
in the Impact Region, 1970

Florida	Number	Median Value
	1,260,219	\$15,100
Impact Counties		
Alachua	14,963	10,600
Baker	986	5,000
Bradford	2,051	8,000
Clay	5,073	13,700
Columbia	3,727	9,900
Dixie	859	6,300
Duval	97,899	11,900
Flagler	688	11,700
Gilchrist	367	5,900
Hamilton	1,024	6,900
Lafayette	220	5,100
Madison	1,543	7,100
Nassau	3,207	9,700
Putnam	6,722	9,300
St. Johns	6,004	11,800
Suwannee	1,908	7,800
Taylor	2,296	8,100
Union	534	6,800

Table I
Farm Characteristics and Market Value
of
Products Sold-1969

	Number	Ave. Size (Acres)	% Land in Farms	Market Value Products Sold
Florida	35,586	394.3	40.5	\$1,130,474,000
Counties				
Alachua	906	335.6	51.9	14,539,000
Baker	180	433.4	20.9	3,983,000
Bradford	363	161.1	31.1	11,408,000
Clay	189	824.3	41.1	10,633,000
Columbia	625	245.5	30.6	9,708,000
Dixie	114	1,450.4	37.3	482,000
Duval	320	232.2	15.2	12,920,000
Flagler	79	1,160.1	29.4	3,179,000
Gilchrist	334	299.6	45.2	3,293,000
Hamilton	402	283.2	34.6	5,576,000
Lafayette	325	233.5	21.6	6,008,000
Madison	737	278.6	45.6	8,279,000
Nassau	221	295.2	15.7	11,556,000
Putnam	462	601.7	55.8	11,835,000
St. Johns	219	300.1	17.0	11,957,000
Suwannee	1,091	252.2	62.7	13,451,000
Taylor	225	471.9	15.8	922,000
Union	242	304.6	47.8	4,080,000
			Total	\$143,809,000

Source: Florida Statistical Abstract, 1972

Table J
Commercial Forest Land By Class Of Ownership
in the
Impact Region (1,000 Acres)

	All Ownerships	National Forests	Misc. Federal	State	County, Municipal	Forest Industry	Farmer	Misc. Corporate	Misc. Private
<u>Florida</u>	16,231.6	1,035.3	617.8	466.3	26.1	5,216.5	2,915.8	1,909.6	4,044.2
<u>Impact Region</u>	5,438.7								
Alachua	311.0	-	-	6.7	0.4	111.1	96.4	35.5	60.9
Baker	349.5	74.6	-	0.1	-	165.7	10.9	40.0	58.2
Bradford	148.1	-	-	8.4	1.1	73.4	21.7	10.9	32.6
Clay	326.2	-	0.7	53.6	0.8	89.7	92.7	4.0	84.7
Columbia	385.2	73.0	-	-	0.3	121.6	97.6	43.9	48.8
Dixie	393.6	-	-	0.4	0.3	385.0	1.3	1.3	5.3
Duval	290.2	-	14.1	3.7	1.6	39.9	16.8	12.6	201.5
Flagler	263.6	-	-	0.1	0.4	184.5	16.7	-	61.9
Gilchrist	150.8	-	-	0.1	0.3	56.8	50.4	14.4	28.8
Hamilton	252.2	-	-	-	-	143.9	22.8	-	85.5
Lafayette	294.7	-	-	-	0.4	222.4	27.8	14.0	30.1
Madison	323.9	-	-	-	-	158.6	122.0	-	43.3
Nassau	342.6	-	-	2.9	0.6	193.5	7.3	10.9	127.4
Putnam	368.7	22.8	0.3	4.8	0.2	103.5	94.8	29.2	113.1
St. Johns	293.4	-	-	0.2	0.4	140.5	43.1	28.7	80.5
Suwannee	204.2	-	-	-	0.1	29.6	90.7	7.0	76.8
Taylor	607.0	-	-	0.1	0.3	502.9	8.7	25.9	69.1
Union	133.8	-	-	5.1	-	76.5	48.2	-	4.0

Source: Florida Statistical Abstract, 1972

Table K

Value of Forest Products Sold on Farms
and
Total Round Pulpwood Produced by Counties

	Value Forest Products Sold on Farms, 1969 (\$2500 and Over)	Round Pulpwood Production (Cords) 1969	1970
Florida	\$4,786,799	\$3,020,675	\$2,941,938
Impact Region	1,720,715	1,584,536	1,456,682
Alachua	162,784	115,184	58,630
Baker	32,581	99,750	101,869
Bradford	71,455	68,807	65,937
Clay	65,508 (a)	97,017	79,091
Columbia	77,902 (a)	116,268	95,309
Dixie	15,491	111,580	99,432
Duval	61,201	75,044	77,340
Flagler	217,776	40,139	40,376
Gilchrist	64,595	30,644	22,470
Hamilton	112,285 (a)	94,074	74,722
Lafayette	100,648 (a)	108,882	101,663
Madison	150,721	96,562	88,585
Nassau	64,107	140,125	131,549
Putnam	209,089	59,358	56,586
St. Johns	78,443	69,601	77,772
Suwannee	106,393	36,900	54,421
Taylor	10,108	176,498	160,985
Union	119,628	48,105	69,945

(a) Partial Data

Source: Florida Statistical Abstract, 1972

Table L

Total Non-Agricultural Employment
in the
Impact Region, 1971

Source: Florida Statistical Abstract, 1972

	Total Workers	Manufacturing	Contract Construction	Transportation	Wholesale Retail Trade	Finance Real Estate Insurance	Services Miscellaneous	Government	Mining	All Other Workers
Florida	2,588,800	320,800	168,000	158,000	591,100	135,200	416,700	420,200	8,500	370,300
Impact Region	327,400	41,640	16,260	24,700	72,220	22,340	42,780	68,880		38,580
Alachua	45,220	3,120	2,120	1,240	7,840	1,740	3,720	20,300	0	5,140
Baker	2,160	140	20	60	240	20	100	1,320	0	260
Bradford	2,700	440	80	40	520	80	540	660	0	340
Clay	5,700	800	220	380	800	180	940	1,560	0	820
Columbia	9,380	1,740	180	280	1,760	240	1,140	2,620	0	1,420
Dixie	1,480	440	120	60	180	60	100	260	0	260
Duval	215,500	24,400	11,500	20,800	52,600	19,000	30,400	33,400	(a)	23,400
Flagler	980	180	20	20	180	20	240	200	0	120
Gilchrist	600	0	40	20	140	20	40	240	0	100
Hamilton	2,400	260	140	20	300	20	940	360	0	360
Lafayette	460	60	20	20	60	20	60	180	0	40
Madison	2,260	700	80	100	540	60	220	120	0	440
Nassau	7,180	2,240	400	160	1,000	80	540	1,720	0	1,040
Putnam	10,180	3,400	280	380	1,700	220	820	1,700	0	1,680
St. Johns	9,140	1,060	600	540	2,080	280	1,680	1,580	0	1,320
Suwannee	5,040	440	160	400	1,460	180	820	700	0	880
Taylor	5,300	2,040	260	180	740	100	440	820	0	720
Union	1,720	180	20	0	80	20	40	1,140	0	240

(a) "Mining" is combined with Services Miscellaneous

Table M

Civilian Labor Force, By Employment Status, By County
For Impact Region, March 1971

	Total Number Civilian Labor Force	Total Number Unemployed	Unemployment Rate	Non-Agriculture Wage and Salary Workers	Non-Agriculture Self Employed	Agriculture Wage and Salary Workers	Agriculture Self Employed
Florida	2,875,700	125,400	4.4	2,218,500	370,300	158,400	(a)
Impact Region	348,140	9,540	2.7	288,820	38,580	4,840	6,260
Alachua	47,960	1,280	2.7	40,080	5,140	600	860
Baker	2,600	80	3.1	1,900	260	300	60
Bradford	3,200	160	5.0	2,360	340	60	280
Clay	6,680	340	5.1	4,830	820	440	200
Columbia	10,460	200	1.9	7,960	1,420	140	740
Dixie	1,680	60	3.6	1,220	260	20	120
Duval	221,900	5,600	2.5	192,100	23,400	700	(a)
Flagler	1,360	80	5.9	860	120	220	80
Gilchrist	940	40	4.3	500	100	60	240
Hamilton	2,960	80	2.7	2,040	360	180	300
Lafayette	840	40	4.8	420	40	20	320
Madison	3,420	180	5.3	1,820	440	260	720
Nassau	7,900	260	3.3	6,140	1,040	180	280
Putnam	12,020	560	4.7	8,500	1,680	860	420
St. Johns	10,180	340	3.3	7,820	1,320	580	120
Suwannee	6,440	120	1.9	4,160	880	160	1,120
Taylor	5,700	120	2.1	4,580	720	20	260
Union	1,900	(b)	-	1,480	240	40	140

(a) Included in total for Wage & Salary Workers

(b) Less than 10

Source: Florida Statistical Abstract, 1972

Table N

Per Capita Personal Income By Counties in
The Impact Region, 1970

U. S.	\$3,921
Florida	3,657
Impact Counties	
Atachua	3,193
Baker	1,859
Bradford	2,394
Clay	1,845
Columbia	3,048
Dixie	2,555
Duval	3,950
Flagler	2,571
Gilchrist	1,983
Hamilton	3,081
Lafayette	3,401
Madison	2,293
Nassau	3,502
Putnam	2,699
St. Johns	3,199
Suwannee	3,035
Taylor	3,045
Union	1,830

Source: Florida Statistical Abstract, 1972

APPENDIX 8

U.S. Forest Service

List of Common Plant Species
on the Osceola National Forest

List of Common Plant Species for the Osceola National Forest

Swamp Plant Community

(Includes Creek Swamps and Cypress-Blackgum Swamps)

Woody Plants

<u>Common Name</u>	<u>Scientific Name</u>
Slash Pine	<u>Pinus elliottii</u>
Pond Cypress	<u>Taxodium ascendens</u>
Sweetgum	<u>Liquidambar styraciflua</u>
Black gum	<u>Nyssa sylvatica</u>
Tupelo Gum	<u>Nyssa aquatica</u>
Pond Pine	<u>Pinus serotina</u>
Red Maple	<u>Acer rubrum</u>
Water Oak	<u>Quercus nigra</u>
Loblolly Pine	<u>Pinus taeda</u>
Sweetbay	<u>Magnolia virginiana</u>
Red Bay	<u>Persea borbonia</u>
Wax Myrtle	<u>Myrica cerifera</u>
Buttonbush	<u>Cephalanthus occidentalis</u>
Dahoon	<u>Ilex cassine</u>
Yaupon	<u>Ilex vomitoria</u>
Virginia Willow	<u>Itea virginica</u>
Saw Palmetto	<u>Serenoa repens</u>
Common Gallberry	<u>Ilex glabra</u>
Large Gallberry	<u>Ilex coriacea</u>
Fetterbush	<u>Lyonia lucida</u>
Sweet Pepper Bush	<u>Clethra alnifolia</u>
Blackberry	<u>Rubus spp.</u>
Greenbrier	<u>Smilax spp.</u>
Blueberry	<u>Vaccinium spp.</u>
Viburnum (Haw)	<u>Viburnum spp.</u>
Buckthorn	<u>Bumelia lacuum</u>

Herbaceous Plants

Threeawns	<u>Aristida spp.</u>
Beakrush	<u>Rhynchospora spp.</u>
Bluestem	<u>Andropogon spp.</u>
Carpetgrass	<u>Axonopus affinis</u>
Pipewort (Hatpins)	<u>Eriocaulon spp.</u>
Marsh Pennywort	<u>Centella rapanda</u>
Yellow-eyed Grass	<u>Xyris spp.</u>
Smartweed	<u>Polygonum spp.</u>
Arrowhead	<u>Sagittaria spp.</u>

Sedges
Rushes
Pitcher Plant
Lizard's Tail
Pickerel Weed
Hypericum
Club Moss
Sundew
Meadow Beauties
Indian Pipe
Milkweed
Marsh-Pink
Bladderwort
Waterhsield
Cinnamon Fern
Violets
Muscadine
Peppervine
Panicums
Ferns

Cyperus spp.
Juncus spp.
Sarracenia flava
Saururus cernuus
Pontederia lanceolata
Hypericum spp.
Lycopodium spp.
Drosera rotundifolia
Rhexia spp.
Monotropa uniflora
Asclepias spp.
Sabatia spp.
Utricularia spp.
Brasenia schreberi
Osmunda cinnamomea
Viola spp.
Vitus spp.
Ampelopsis arborea
Panicum spp.
(various genera and spp.)

Pine Flatwoods Plant Community
Longleaf and Slash Phases

Woody Plants

<u>Common Name</u>	<u>Scientific Name</u>
Slash Pine	<u>Pinus elliottii</u>
Longleaf Pine	<u>Pinus palustris</u>
Common Gallberry	<u>Ilex glabra</u>
Saw Palmetto	<u>Serenoa repens</u>
Fetterbush	<u>Lyonia lucida</u>
Wax-Myrtle	<u>Myrica cerifera</u>
Large Gallberry	<u>Ilex coriacea</u>
Blackgum	<u>Nyssa sylvatica</u>
Red Maple	<u>Acer rubrum</u>
Runner Oak	<u>Quercus pumila and Quercus Minima</u>
Red Bay	<u>Persea borbonia</u>
Sweetbay	<u>Magnolia virginiana</u>
Myrtle Dahoon	<u>Ilex cassine</u>
Yaupon	<u>Ilex vomitoria</u>
Virginia Willow	<u>Itea virginica</u>
Greenbrier	<u>Smilax spp.</u>
Sweet Pepper Bush	<u>Clethra alnifolia</u>
Loblolly Bay	<u>Gordonia lasienthus</u>
Tarflower	<u>Befaria racemosa</u>
Blueberries	<u>Vaccinium spp.</u>
Blackhaw (Swamp)	<u>Viburnum nudum</u>
Blackberry	<u>Rubus spp.</u>
Hypericum	<u>Hypericum spp.</u>
Beautyberry	<u>Callacarpa americana</u>
Staggerbush	<u>Lyonia fruiticosa</u>
Oaks	<u>Quercus spp.</u>
Wild Azaleas	<u>Rhododendron spp.</u>

Herbaceous Plants

Carpetgrass	<u>Axonopus affinis</u>
Threeawn	<u>Aristida spp.</u>
Bluestem	<u>Andropogon</u>
Panicum	<u>Panicum spp.</u>
Paspalum	<u>Paspalum spp.</u>
Yellow-eyed Grass	<u>Xyris spp.</u>
Deer Tongue	<u>Trilisa odoratissima</u>
Dropseed (Wire Grass)	<u>Sporobolus junceus</u>
Meadow Beauty	<u>Rhexia spp.</u>
Butterfly Pea	<u>Centrosema virginianum</u>
Muscadine	<u>Vitis spp.</u>
Poor-Joe	<u>Diodia teres</u>

Cutover Muhly (Wire Grass)
Marsh-Pink
Violets
Goldenasters
Lizard's Tail
Pipeworts (Hatpin)
Polygonella
Smartweed
Sundew
Sensitive Briar
Fleabanes
Goldenrod
Dog Fennel
Rushes
Lespedeza
Braken Fern
Ferns

Muhlenbergia expansa
Sabatia spp.
Viola spp.
Chrysopsis spp.
Saururus cernuus
Eriocaulon spp.
Polygonella spp.
Polygonum spp.
Drosera rotundifolia
Schrankia microphylla
Pluchea spp.
Solidago spp.
Eupatorium spp.
Juncus spp.
Lespedeza spp.
Pteridium aquilinum
(various genera and spp.)

RULES
OF THE
DEPARTMENT OF POLLUTION CONTROL
CHAPTER 17-9
MINIMUM REQUIREMENTS FOR
EARTHEN DAMS, PHOSPHATE MINING
AND PROCESSING OPERATIONS

Complete Revision 12-8-72.

- 17-9.01 General
- 17-9.02 Definitions
- 17-9.03 Construction of new dams
 - (1) Design
 - (2) Site Preparation
 - (3) Material to be used
 - (4) Water level control
 - (5) Methods of construction
 - (6) Documentation
- 17-9.04 Operational Requirements
 - (1) Active dams
 - (2) Retired dams
- 17-9.05 Inspections and Records
 - (1) New dams
 - (2) Active dams
 - (3) Retired dams
 - (4) Corrective Actions
 - (5) Annual Inspections
 - (6) Abandonment
 - (7) Critical conditions
 - (8) Trouble areas
 - (9) Investigations of failures

17-9.01 General. It is the conclusion of the Florida Pollution Control Board that the most common causes for past failures of earthen dams used for impoundment of liquid industrial wastes from phosphate mining and processing operations have been insecure foundations, inadequate supervision of construction, poor routine inspections, and/or inadequate maintenance. It is the intent of the Board to establish requirements which will eliminate or reduce failures of earthen dams to the lowest possible number. This rule, therefore, emphasizes an intensive surveillance program which is designed to expose critical conditions in dams sufficiently in advance of failure to permit corrective maintenance and avoidance of disaster. It shall be incumbent upon owners of earthen dams to construct and maintain them on the basis that these requirements are minimum safety standards which shall normally be exceeded to ensure that there shall be no discharge from said dams into the waters of the State of Florida other than that specifically authorized by the Department of Pollution Control. All earthen dams for impounding, above natural ground elevation, liquid industrial wastes from phosphate mining and processing operations shall be constructed in accordance with a design and set of detailed specifications prepared, sealed and signed by a professional engineer registered in Florida who is competent in the field of dam design, construction

and maintenance. Results of field and laboratory tests from an adequate number of test borings and soil samples shall be the basis for computations pertaining to seepage and stability analyses. Construction specifications contained in this rule shall apply to dams on which construction begins after the effective date of the rule. Inspection and maintenance specifications contained in this rule shall apply to all active and retired phosphate industry dams immediately upon the effective date of the rule.

General Authority 403.061(25) FS. Law Implemented 403.061(25) FS. History—Revised 12-8-72.

17-9.02 Definitions.

(1) Abandoned dam — An abandoned dam is one associated with a settling area from which sufficient water has been removed to make the residue no longer a pollutional threat to surface waters or a hazard of any type to land areas.

(2) Active dam — An active dam is one associated with a settling area into which wastewater is being introduced for purposes of clarification or in which free water remains in contact with the dam.

(3) Berm — A shelf that breaks the continuity of the slope of an embankment in order to arrest the velocity of storm water flowing down the face and/or to enhance the stability of the embankment.

(4) Cast dam — A cast dam is one constructed of fill which was put in place by a dragline or other machine capable of free dumping, and is not mechanically compacted in progressive layers.

(5) Core — A zone of relatively impervious material within the dam to resist the flow of water through the dam.

(6) Cut-off-Trench — An excavation into the foundation material to accept an extension of the core.

(7) Drain — A material more pervious than the dam which allows seepage water to drain freely from the dam while preventing piping or internal erosion of the fill material.

(a) Blanket drain is a continuous horizontal drain layer within or beneath the downstream portion of the dam.

(b) Chimney drain is a continuous sloping drain layer within the downstream portion of the dam.

(c) Toe drain is a wedge-shaped drain supporting the downstream toe of the dam.

(8) Earthen dam — A barrier to the flow of liquids which is constructed of naturally occurring soil.

(9) Filter — A zone of material sufficiently more pervious than the dam or foundation so that free water will drain through the filter, but at the same time sufficiently fine grained to prevent piping of the fill material.

(10) Freeboard — The height of the lowest point on the crest of the dam above the highest adjacent liquid surface within the impoundment.

(11) Inside (upstream) slope — The face of the dam which will be in contact with the impounded liquids.

(12) Outside (downstream) slope — The face of the dam which will not be in contact with the impounded liquids.

(13) Phreatic Surface — The upper surface of the water table within the mass of the dam. It would be the elevation of the water surface if an open hole were dug into the dam.

(14) Piping — Progressive erosion of soil within the dam, starting downstream and working upstream, creating a tunnel into the dam. Piping occurs when the velocity of the flow of seepage water is sufficient for the water to transport material from the embankment.

(15) Retired dam — A retired dam is one associated with a settling area into which no additional wastewater is currently being introduced but which could be reactivated.

(16) Rolled dam — A rolled dam is one constructed of fill which is placed in layers which are mechanically compacted individually prior to placement of the next higher layer.

(17) Safety Factor — A numerical value which represents the ratio of the ultimate strength of a material or structure to the stress which will be applied to that material or structure.

(18) Settling area — The area surrounded by dikes, embankments, or natural soil masses into which liquids are introduced for the purpose of separating suspended solid matters from water used for transportation of such matter.

(19) Tailwater level — The elevation of the water at the downstream toe of the dam.

(20) Toe — The toe of the dam is the junction between the face of the dam and the adjacent terrain.

General Authority 403.061(25) FS, Law Implemented 403.061(25) FS. History—Revised 12-8-72.

17-9.03 Construction of New dams.

(1) Design.

(a) Site investigation — The general area desired for use as a settling area shall be carefully inspected by the design engineer prior to selection of the exact location for a dam. Areas of uneven natural subsidence, sink-hole, pockets of organic matter, or other unstable soils shall be avoided, unless special provisions are made for their correction.

(b) Soil testing — A program of soil sampling and testing adequate to determine the characteristics of the foundation material which will support the proposed dam and of the material to be used for construction of the dam shall be performed. Sampling shall include borings and/or in-place samples from the exposed excavation face. All borings shall be logged using a recognized engineering soil classification system, (such as Unified System) with location and depths of all samples recorded on the log. Tests including, but not limited to, the determination of in-place densities, shear-strength; and permeabilities

of the foundation and embankment soils shall be performed. Tests on foundation soils shall be performed on either undisturbed samples or on the in-place soil. Tests on embankment soils shall be performed on samples remolded to the densities to be used in construction. All soil test data used for design shall be derived from tests performed in compliance with the American Society of Testing Materials, American Association of State Highway Officials, or U.S. Army Corps of Engineers soil testing specifications and procedures.

(c) Cross Section design — There shall be a minimum freeboard of five feet (5') below the inside crest. The outside crest of the top of the dam shall be higher than the inside crest in order to force all crest drainage to the inside of the dam. Both inside and outside slopes shall be no steeper than two horizontal to one vertical. The design shall provide positive seepage control features, such as but not limited to:

- (i) Cut-off trench in natural soil foundations.
- (ii) Clay core.
- (iii) Blanket drain.

(iv) Chimney drain and toe drain. The top of the dam shall include a roadway which will permit wheeled vehicle traffic at all times. The design shall also incorporate a roadway near the downstream toe which will permit wheeled vehicle traffic around the perimeter of the dam for purposes of inspection of the slope, toe and natural ground beyond the toe, as well as maintenance.

(d) Stability analysis — A flow net analysis shall be made to determine the location of the phreatic surface, flow lines, and lines of equal head within the foundation and fill being designed. This analysis may be based on graphical construction, electrical or liquid analogs, soil prototype methods, or other accepted methods. The flow net and stability analysis shall use the maximum pool elevation with not less than five feet (5') of clear water, this elevation being five feet (5') below the inside crest of the dam. Possible fluctuations of the tail water level shall be included in the analyses.

(e) Design safety factors — The designing engineer shall use the following minimum safety factors: 1.75 for horizontal shear at base of fill; 1.5 for horizontal shear within the fill due to seepage through the outer face; 1.5 for bearing capacity of foundation soils; 1.5 for protection against shear failure of any circular arc in either inside or outside slope. It is imperative that water pressure distribution be included in the analyses.

(f) If a cast dam is to be constructed where adequate site preparation, as defined in Section 17-9.03(2) below, has not been accomplished; or where the fill materials do not meet the requirements of Section 17-9.03(3) below; then the design shall incorporate either of the following alternatives:

(i) A portion of the material which forms the downstream slope shall be removed and the foundation thus exposed shall be prepared in the same manner as is prescribed herein for a rolled dam. Fill material shall then be placed as a rolled embankment which shall be of such design that the safety factor with respect to downstream movement of the rolled section shall be no less than 1.2 when assuming that the remaining cast material below the phreatic surface has become liquid.

(ii) Sand tailings shall be placed against the downstream slope to the extent that the wedge so

formed shall have a safety factor with respect to downstream movement of no less than 1.2 when assuming that the cast material below the phreatic surface has become liquid.

(g) When the foundation for a cast dam meets the requirements of Section 17-9.03(2) and the materials used for the fill meet the requirements of Section 17-9.03(3), then the dam shall be designed in accordance with sections 17-9.03(1)(a)(b)(c)(d) and (e); except that the computations of all required safety factors shall be based on only seventy-five percent (75%) of the indicated strengths of the cast materials which are tested at the same density as will exist within the dam.

(2) Site Preparation — Ground which will become the foundation of earthen dams shall be stripped of all vegetation and organic detritus or residue, including muck, mud, slimes, or other material which would flow or undergo excessive consolidation under heavy loading. All earth foundation surfaces on which fill is to be placed shall be scarified or moistened and compacted prior to spreading of first course of fill material, and the dam base shall be well drained during construction, except when placing hydraulic fill.

(3) Material to be Used — Material used for earthen dams shall be free of stumps, vegetation, trees, palmettos, muck, and other extraneous matter which could affect the compactability, density, permeability, or shear strength of the finished dam. Tailings may be used for dam fill when such a completed dam will meet the seepage and structural requirements in Section 17-9.03(1).

(4) Water level control — Sufficient water level control structures shall be installed in the impoundment area behind an earthen dam to maintain the minimum 5' freeboard and to accommodate the release of storm water resulting from heavy rainfall. Such structures shall be adequate to accommodate twelve (12) inches of rainfall on the watershed involved during any period of twenty-four (24) hours. All settling areas covering an area greater than fifty (50) acres shall have no fewer than two (2) water level control structures.

(5) Methods of Construction

(a) Each new dam shall be constructed to meet or exceed the minimum safety requirements of the specifications and design for that dam. Draglines, drag scrapers, tractor or other appropriate earthmoving equipment shall be used to place materials in dam construction. Materials used in rolled dams shall be blended prior to compaction. The soil shall be compacted and density tests shall be performed to ensure that the designed densities are obtained. A qualified representative of the design engineer shall be present on the site each working day during construction of a rolled dam or during the shaping and strengthening of a cast dam to ensure that materials and construction methods meet all specifications of the design. The Department of Pollution Control Regional Engineer shall be advised of the date on which construction or shaping of a new dam will begin so that he can inspect the site.

(b) Tailings may be deposited hydraulically on the upstream slopes of existing dams provided that the elevation of the discharge water is never higher than five feet below the adjacent crest of the dam. If water is impounded above natural ground level, tailings may be deposited on the downstream portion

of a dam by either of the following procedures:

(i) If the tailings are dewatered to not less than 50% solids by weight at the discharge point, the tailings may be deposited continuously.

(ii) If the discharge point is at or beyond the point at which the toe meets the foundation, or the discharge point is at least seventy-five (75) feet from the point at which water meets the dam, the tailings may be deposited continuously by hydraulic methods.

(c) Areas around any water level control structure pipe, any other conduit, or any surface of discontinuity between materials within the mass of the dam shall be carefully installed to avoid potential concentration of seepages. All conduits through dams shall have two or more seepage collars spaced in accordance with good engineering practices pertinent to the material used for the fill. Two collars will be installed within the core when there is a core within a dam. All pipes and joints in pipes extending through a dam shall be made leakproof and shall be constructed of materials suitable for the fluids carried and the load imposed. In order to avoid leaks associated with differential settlement, conduits through dams shall not be rigidly supported by piles or piers. Backfill around conduits shall be of a density that is equal to or greater than those of the surrounding embankment. Particular attention shall be devoted to the lower third of the conduit.

(6) Documentation

(a) The owner of an earthen dam shall maintain in a permanent file the following construction records pertaining to said dam. He shall furnish a similar file within 30 days after completion of the dam to the Department of Pollution Control Regional Engineer for future reference should it be needed.

(i) Aerial photo of construction site after mining in the immediate area has been terminated and before shaping of the final dam.

(ii) Design drawings and calculations.

(iii) Design specifications.

(iv) Results of all soil tests on foundations and fill materials.

(v) Logs of borings and engineering geology reports.

(vi) Certified copies of construction progress inspections pertinent to core trench, toe drain, internal drains, and other significant phases of the structure. Photographs of various structural items may be included in the file.

(vii) Aerial photo of completed dam taken within 30 days after construction is completed, weather permitting.

(viii) Description of and justification for all deviations or variances from the design plans or specifications.

General Authority 403.061(25) FS. Law Implemented 403.061(25) FS. History—Revised 12-8-72.

17-9.04 Operational requirements.

(1) Active dams — The water level in a settling area shall not be raised or lowered more than (1) foot during any twenty-four (24) hour period, except under emergency conditions. The water level shall not be lowered more than five (5) feet per month. Each active settling area shall be inspected as prescribed in Section 17-9.05(2). Vegetative cover adequate to inhibit wind and water erosion shall be established

and maintained on all exposed surfaces of the dam. Such vegetation shall be maintained sufficiently low to permit visual inspection of the soil surfaces in critical areas outlined in Section 17-9.05.

(2) Retired dams — The vegetative cover on retired dams shall be maintained sufficiently low to permit visual inspection of the soil surfaces in critical areas outlined in Section 17-9.05. In addition, the water level control structures in retired dams shall be adjusted to suit the circumstances of storm drainage requirements as the solids concentrations of the impounded liquids becomes progressively higher. Pools of trapped storm water and/or clarified wastewater shall be drained away from the upstream face of the dam to the greatest extent possible. A dam shall not be considered as retired so long as pools of free water remain in contact with the dam.

General Authority 403.061(25) FS. Law Implemented 403.061(25) FS. History—Revised 12-8-72.

17-9.05 Inspections. Personnel or agents of the Department of Pollution Control may accompany inspectors on any routine inspection required by this rule, or inspect settling areas at any other time which is reasonable under the circumstances involved. They may also examine any routine inspection reports and be furnished copies thereof upon request.

(1) A completed new dam shall be thoroughly inspected prior to the deposition of industrial wastes above ground level behind it. Toe drains, spillways and water level control structures shall be certified by the design engineer as meeting all specifications of the design, and degree of compaction of the fill shall also be certified. Legible photographs, either aerial or ground, may be used to document this initial inspection, but shall not in themselves constitute certification. A complete file describing the items inspected and their condition shall be maintained by the owner, and a copy shall be furnished to the Department of Pollution Control Regional Engineer.

(2) Active dams shall be inspected weekly unless a defect has been disclosed, in which event the defective area of the dam shall be inspected daily until corrective maintenance has cured such defect. Inspections shall be made by competent employees of the owner of the dam who have been instructed and tested by a qualified engineer regarding items to be checked. The findings on each inspection shall be recorded, signed by the inspector, and filed after any necessary corrective action is initiated by supervisory personnel. The inspector shall travel on foot, horseback, or wheeled vehicle suitable for traversing the terrain involved at slow speeds. Items to be noted on weekly (or daily) inspections shall include, but not limited to:

(a) Condition of vegetation on dam and in area for fifty feet (50') downstream from the outside toe.

(b) Piezometric levels within the mass of the dam when instrumentation has been installed.

(c) Condition of soil surfaces on top and slopes of the dam and in area for fifty feet (50') downstream from the outside toe.

(d) Condition of drainage ditches in the area of the base of the dam.

(e) Liquid surface elevation and amount of freeboard. (This is to be recorded daily when limitations could be violated during a week of operations.)

(f) Condition of spillways and water level

control structures, including all conduits exiting the dams.

(3) Retired dams shall be inspected monthly by a competent employee of the owner of the dam who has been instructed and tested by a qualified engineer regarding items to be checked. The findings on each inspection shall be recorded, signed by the inspector, and filed after any necessary corrective action is initiated by supervisory personnel. Such inspection shall include, but not limited to:

(a) Condition of soil surfaces on the crest, slopes, and area fifty feet (50') downstream from the dam.

(b) Determination of piezometric levels within the mass of the dam while instrumentation of the dam has been determined to be necessary by an engineer.

(c) Determination of seepage characteristic through analyses of infra-red aerial photographs or thermal imagery when surveillance by such means has been proposed by the owner if the dam and approved by the Department of Pollution Control Regional Engineer.

(d) Condition of Spillway and water level control structures, including all conduits exiting the dam, and any wooden structures which are subject to rotting.

(4) When a condition as listed in Section 17-9.05(7) is found during a weekly or monthly inspection, the inspector shall ensure that a competent technical representative of the dam owner is made aware of the condition immediately. A report of the condition and the actions proposed for its correction shall be made to the Department of Pollution Control Regional Engineer at the earliest practicable time. The Regional Engineer may confirm correction of the condition at an appropriate time.

(5) Each active and each retired dam shall be inspected annually by an engineer registered in Florida who is experienced in the field of construction and maintenance of dams. Costs for such inspections shall be borne by owners of the dams. One copy of the report pertaining to such annual inspections shall be furnished to the Department of Pollution Control Regional Engineer, and the original of the report shall be retained by the owner. These inspections shall include, but not be limited to:

(a) Analyses of seepage or other significant items shown on all aerial photographs of the dam which have been taken for any reason since the date of last annual inspection.

(b) Condition of soil surfaces on top and slopes of the dam and in areas for fifty feet (50') downstream from the outside toe.

(c) Review of all weekly, daily and monthly inspection reports to evaluate the effectiveness of maintenance which was done to the dam during the period since the last annual inspection.

(d) Examination and interpretation of data obtained from any instrumentation installed in the mass of the dam.

(e) Condition of spillway and water level control structures, including all conduits exiting the dam and any wooden structures which are subject to rotting.

(6) A retired dam which is to be abandoned shall be inspected by an engineer registered in Florida who is competent to determine that no further

impoundment is being accomplished by the dam involved and that no further surveillance or maintenance is required. A copy of the final inspection used by the engineer for making his determination as above shall be furnished to the Department of Pollution Control Regional Engineer, and a copy shall be retained by the owner of the dam. Costs for such terminal inspections shall be borne by the owners of the dams which are to be abandoned.

(7) Any of the following items shall be considered as indicating a critical condition which requires immediate investigation and may require emergency maintenance action:

(a) Seepage on outer face or downstream from the toe in which there are boils, sand cones or deltas.

(b) Silt accumulations, boils, deltas, or cones in the drainage ditches at dam bases.

(c) Cracking of soil surface on crest or either face of the dam.

(d) Bulging of the downstream face of the dam.

(e) Seepage, damp area, or boils in vicinity of or erosion around a conduit through the dam.

(f) Any subsidence of the crest or faces.

(8) The following items shall be considered as indicating potential trouble areas which should be closely checked on subsequent inspections.

(a) Overgrowth patches of vegetation on downstream face or close area downstream from the toe.

(b) Surface erosion, gully, or wave erosion of the upstream face of the dam.

(c) Surface erosion, gully, or damp areas on the downstream face of the dam, including the berm and the area downstream from the outside toe.

(d) Erosion below any conduit exiting the dam.

(e) Wet areas or soggy soil in downstream face of dam or in natural soil below dam.

(9) In the event of a dam failure which permits deleterious substances to enter waters controlled by the State or to cause other damages, the chairman of the Florida State Pollution Control Board may convene at once a special panel of experts with experience in design and construction of earthen dams from government, industry, private engineering firms and/or educational institutions to gather data and to investigate the cause of the failure and to make recommendations for corrective actions. The owner of a failed dam shall take immediate action to arrest the flow of deleterious material when such is possible, and shall have the failed area of the dam photographed at the earliest practicable time. If feasible, the owner shall construct a coffer dam upstream from the failed area to impound materials. This will preserve the area of failure for detailed investigation, and thus contribute to factual data to be used in future safety considerations.

General Authority 403.061(25) FS. Law Implemented 403.061(25) FS. History—Revised 12-8-72.

APPENDIX 10

U.S. Department of Interior

Surface Exploration, Mining and Reclamation of Lands (Part 23, Title 43C.F.R.)

Title 43—PUBLIC LANDS: INTERIOR

Subtitle A—Office of the Secretary of the Interior

[Circular No 2259]

PART 23—SURFACE EXPLORATION, MINING AND RECLAMATION OF LANDS

A new Part 23 is hereby added to Title 43 Code of Federal Regulations, to become effective upon publication in the FEDERAL REGISTER.

- Sec.
- 23.1 Purpose.
- 23.2 Scope.
- 23.3 Definitions.
- 23.4 Application for permission to conduct exploration operations.
- 23.5 Technical examination of prospective surface exploration and mining operations.
- 23.6 Basis for denial of a permit, lease, or contract.
- 23.7 Approval of exploration plan.
- 23.8 Approval of mining plan.
- 23.9 Performance bond.
- 23.10 Reports: Inspection.
- 23.11 Notice of noncompliance: Revocation.
- 23.12 Appeals.
- 23.13 Consultation.

§ 23.1 Purpose.

It is the policy of this Department to encourage the development of the mineral resources under its jurisdiction where mining is authorized. However, the public interest requires that, with respect to the exploration for, and the surface mining of, such minerals, adequate measures be taken to avoid, minimize, or correct damage to the environment—land, water, and air—and to avoid, minimize, or correct hazards to the public health and safety. The regulations in this part prescribe procedures to that end.

§ 23.2 Scope.

(a) Except as provided in paragraphs (b) and (c) of this section, the regulations in this part provide for the protection and conservation of nonmineral resources during operations for the discovery, development, surface mining, and onsite processing of minerals under permits, leases, or contracts issued pursuant to: The Mineral Leasing Act of February 25, 1920, as amended (30 U.S.C. 181–287); the Mineral Leasing Act for Acquired Lands (30 U.S.C. 351–359); the Materials Act of July 31, 1947, as amended (30 U.S.C. 601–604); and title 23, United States Code, section 317, relating to appropriation for highway purposes of lands owned by the United States.

(b) The regulations in this part do not cover the exploration for oil and gas or the issuance of leases, or operations thereunder, for oil and gas under the mineral leasing acts, which are covered by regulations in Subpart 3107 and Part 3120 of this title and 30 CFR Part 221; neither do they cover minerals underlying Indian tribal or allotted lands, which are subject to regulations in Title 25 CFR, nor minerals subject to the general mining laws (30 U.S.C. 21–54); nor minerals under the Materials Act which are under the jurisdiction of the Secretary of Agriculture (74 Stat. 205); nor minerals underlying lands, the surface of which is not owned by the U.S. Government.

(c) When more than one permit or contract is expected to be issued to dispose of materials in a particular deposit or tract of land, such as community pits or common use areas, no requirement for reclamation will be made in such permits or contracts and the burden of reclamation will be assumed by the Government. Where reclamation is not required because more than one permit or contract is expected to be issued, there shall be added to the sales price under each permit or contract a reasonable charge to defer the cost of reclamation. In computing such added charge, the authorized officer shall establish the estimated cost of reclamation upon completion of extractive operations for the deposit and the estimated total volume of material to be extracted. The added charge shall be a proportionate share of the estimated cost of reclamation in the same ratio as the material sold under the permit or contract bears to the total estimated volume of the deposit which is expected to be extracted.

(d) The regulations in this part shall apply only to permits, leases, or contracts issued subsequent to the date on which the regulations become effective.

§ 23.3 Definitions.

As used in the regulations in this part:

(a) "Mineral leasing acts" means the Mineral Leasing Act of February 25, 1920, as amended and supplemented (30 U.S.C. 181–287) and the Mineral Leasing Act for Acquired Lands (30 U.S.C. 351–359);

Published in 34 F.R. 852, January 18, 1969 - Effective upon publication.

Circular Distribution List

(b) "Materials Act" means the Act of July 31, 1947, as amended (30 U.S.C. 601-604);

(c) "Mining supervisor" means the Regional Mining Supervisor, or his authorized representative, of the Geological Survey authorized as provided in 30 CFR 211.3 and 231.2 to supervise operations on the land covered by a permit or lease;

(d) "District manager" means the manager of the district office or other authorized officer of the Bureau of Land Management having administrative jurisdiction of and responsibility for the land covered by a permit, lease, contract, application, or offer;

(e) "Overburden" means all the earth and other materials which lie above a natural deposit of minerals and such earth and other materials after removal from their natural state in the process of mining;

(f) "Area of land to be affected" or "area of land affected" means the area of land from which overburden is to be or has been removed and upon which the overburden or waste is to be or has been deposited, and includes all lands affected by the construction of new roads or the improvement or use of existing roads to gain access to an operation and for haulage;

(g) "Operation" means all of the premises, facilities, roads, and equipment used in the process of determining the location, composition or quality of a mineral deposit, or in developing, extracting, or onsite processing of a mineral deposit in a designated area;

(h) "Method of operation" means the method or manner by which a cut or open pit is made, the overburden is placed or handled, water is controlled or affected and other acts performed by the operator in the process of exploring or uncovering and removing or onsite processing of a mineral deposit;

(i) "Holder" or "operator" means the permittee, lessee, or contractor designated in a permit, lease, or contract;

(j) "Reclamation" means measures undertaken to bring about the necessary reconditioning or restoration of land or water that has been affected by exploration or mineral development, mining or onsite processing operations, and waste disposal, in ways which will prevent or control onsite and offsite damage to the environment.

§ 23.4 Application for permission to conduct exploration operations.

No person shall, in any manner or by any means which will cause the surface of lands to be disturbed, explore, test, or prospect for minerals (other than oil and gas) subject to disposition under the mineral leasing acts or the Materials Act without first filing an application for, and obtaining, a permit, lease or contract which authorizes such exploring, testing, or prospecting.

§ 23.5 Technical examination of prospective surface exploration and mining operations.

(a) (1) In connection with an application for a permit or lease under the mineral leasing acts or an application for a permit or an offer to make a contract

under the Materials Act, the district manager shall make, or cause to be made, a technical examination of the prospective effects of the proposed exploration or surface mining operations upon the environment. The technical examination shall take into consideration the need for the preservation and protection of other resources, including recreational, scenic, historic, and ecological values; the control of erosion, flooding, and pollution of water; the isolation of toxic materials; the prevention of air pollution; the reclamation by revegetation, replacement of soil, or by other means, of lands affected by the exploration or mining operations; the prevention of slides; the protection of fish and wildlife and their habitat; and the prevention of hazards to public health and safety.

(2) A technical examination of an area should be made with the recognition that actual potential mining sites and mining operations vary widely with respect to topography, climate, surrounding land uses, proximity to densely used areas, and other environmental influences and that mining and reclamation requirements should provide sufficient flexibility to permit adjustment to local conditions.

(b) Based upon the technical examination, the district manager shall formulate the general requirements which the applicant must meet for the protection of nonmineral resources during the conduct of exploration or mining operations and for the reclamation of lands or waters affected by exploration or mining operations. The general requirements shall be made known in writing to the applicant before the issuance of a permit or lease or the making of a contract, and upon acceptance thereof by the applicant, shall be incorporated in the permit, lease, or contract. If an application or offer is made under the Mineral Leasing Act for Acquired Lands and if the lands are under the jurisdiction of an agency other than the Department of the Interior, the requirements must incorporate provisions prescribed by that agency. If the application or offer is made under the Mineral Leasing Act of February 25, 1920, or the Materials Act, and if the lands are under the jurisdiction of an agency other than the Department of the Interior, the district manager shall consult representatives of the agency administering the land and obtain their recommendations for provisions to be incorporated in the general requirements. If the district manager does not concur in the recommendations, the issues shall be referred for resolution to the Under Secretary of the Department of the Interior and the comparable officer of the agency submitting the recommendations. In the case of disagreement on the issues which are so referred, the Secretary of the Interior shall make a determination on the recommendations which shall be final and binding.

(c) In each instance in which an application or offer is made under the mineral leasing acts, the mining supervisor shall participate in the technical examination and in the formulation of the general requirements. If the lands covered by an application or offer are under the jurisdiction of a bureau of the Department of the Interior other than the Bureau of Land Management, the district

manager shall consult representatives of the bureau administering the land. If the lands covered by the application or offer are under the jurisdiction of an agency other than the Department of the Interior and that agency makes a technical examination of the type provided for in paragraph (a) of this section, district managers and mining supervisors are authorized to participate in that examination.

(d) Whenever it is determined that any part of the area described in an application or offer for a permit, lease, or contract is such that previous experience under similar conditions has shown that operations cannot feasibly be conducted by any known methods or measures to avoid—

(1) Rock or landslides which would be a hazard to human lives or endanger or destroy private or public property; or

(2) Substantial deposition of sediment and silt into streams, lakes, reservoirs; or

(3) A lowering of water quality below standards established by the appropriate State water pollution control agency, or by the Secretary of the Interior; or

(4) A lowering of the quality of waters whose quality exceeds that required by the established standards—unless and until it has been affirmatively demonstrated to the State water pollution control agency and to the Department of the Interior that such lowering of quality is necessary to economic and social development and will not preclude any assigned uses made of such waters; or

(5) The destruction of key wildlife habitat or important scenic, historical, or other natural or cultural features; the district manager may prohibit or otherwise restrict operations on such part of an area.

(e) If, on the basis of a technical examination, the district manager determines that there is a likelihood that there will be a lowering of water quality as described in paragraphs (d) (3) and (4) of this section caused by the operation, no lease or permit shall be issued or contract made until after consultation with the Federal Water Pollution Control Administration and a finding by the Administration that the proposed operation would not be in violation of the Federal Water Pollution Control Act, as amended (33 U.S.C. sec. 466 et seq.) or of Executive Order No. 11288 (31 F.R. 9261). Where a permit or lease is involved the district manager's determination shall be made in consultation with the mining supervisor.

(f) Each notice of a proposed appropriation of a materials site filed by the Department of Transportation under 23 U.S.C. 317 shall be transmitted to the proper district manager. The district manager shall cause a technical examination to be made as provided in paragraph (a) of this section and shall formulate the requirements which the State highway department or its nominee must meet. If the land covered by the proposed appropriation is under the jurisdiction of a bureau of the Department other than the Bureau of Land Management, the district manager shall consult representatives of the bureau administering the land. If the district manager determines, or, in an instance in which

the land is administered by another bureau, a representative of that bureau determines that the proposed appropriation is contrary to the public interest or is inconsistent with the purposes for which such land or materials are reserved, the district manager shall promptly submit the matter to the Secretary of the Interior for his decision. In other instances, the district manager shall notify the Department of Transportation of the requirements and conditions which the State highway department or its nominee must meet.

§ 23.6 Basis for denial of a permit, lease, or contract.

An application or offer for a permit, lease, or contract to conduct exploratory or extractive operations may be denied any applicant or offeror who has forfeited a required bond because of failure to comply with an exploration or mining plan. However, a permit, lease, or contract may not be denied an applicant or offeror because of the forfeiture of a bond if the lands disturbed under his previous permit, lease, or contract have subsequently been reclaimed without cost to the Federal Government.

§ 23.7 Approval of exploration plan.

(a) Before commencing any surface disturbing operations to explore, test, or prospect for minerals covered by the mineral leasing acts the operator shall file with the mining supervisor a plan for the proposed exploration operations.

~~The mining supervisor shall consult with the district manager with respect to the surface protection and reclamation aspects before approving said plan.~~

(b) Before commencing any surface disturbing operations to explore, test, or prospect for materials covered by the Materials Act the operator shall file with the district manager a plan for the proposed exploration operations.

(c) Depending upon the size and nature of the operation and the requirements established pursuant to § 23.5 the mining supervisor or the district manager may require that the exploration plan submitted by the operator include any or all of the following:

(1) A description of the area within which exploration is to be conducted;

(2) Two copies of a suitable map or aerial photograph showing topographic, cultural and drainage features;

(3) A statement of proposed exploration methods, i.e. drilling, trenching, etc., and the location of primary support roads and facilities;

(4) A description of measures to be taken to prevent or control fire, soil erosion, pollution of surface and ground water, damage to fish and wildlife or other natural resources, and hazards to public health and safety both during and upon abandonment of exploration activities.

(d) The mining supervisor or the district manager shall promptly review the exploration plan submitted to him by the operator and shall indicate to the operator any changes, additions, or amendments necessary to meet the requirements formulated pursuant to

§ 23.5, the provisions of the regulations in this part, and the terms of the permit.

(e) The operator shall comply with the provisions of an approved exploration plan. The mining supervisor and the district manager may, with respect to such a plan, exercise the authority provided by paragraphs (f) and (g) of § 23.8 respecting a mining plan.

§ 23.8 Approval of mining plan.

(a) (1) Before surface mining operations may commence under any permit or lease issued under the mineral leasing acts the operator must file a mining plan with the mining supervisor and obtain his approval of the plan. Paragraphs (b) through (g) of this section confer authority upon mining supervisors with respect to mining plans pertaining to permits or leases issued under the mineral leasing acts. The mining supervisor shall consult with the district manager with respect to the surface protection and reclamation aspects before approving said plan.

(2) Before surface mining operations may commence under any permit issued or contract made under the Materials Act, the operator must file a mining plan with the district manager and obtain his approval of the plan. Paragraphs (b) through (g) of this section confer authority upon district managers with respect to mining plans pertaining to permits issued or contracts made under the Materials Act.

(b) Depending on the size and nature of the operation and the requirements established pursuant to § 23.5, the mining supervisor or the district manager may require that the mining plan submitted by the operator include any or all of the following:

(1) A description of the location and area to be affected by the operations;

(2) Two copies of a suitable map, or aerial photograph showing the topography, the area covered by the permit, lease, or contract, the name and location of major topographic and cultural features, and the drainage plan away from the area to be affected;

(3) A statement of proposed methods of operating, including a description of proposed roads or vehicular trails; the size and location of structures and facilities to be built;

(4) An estimate of the quantity of water to be used and pollutants that are expected to enter any receiving waters;

(5) A design for the necessary impoundment, treatment or control of all runoff water and drainage from workings so as to reduce soil erosion and sedimentation and to prevent the pollution of receiving waters;

(6) A description of measures to be taken to prevent or control fire, soil erosion, pollution of surface and ground water, damage to fish and wildlife, and hazards to public health and safety; and

(7) A statement of the proposed manner and time of performance of work to reclaim areas disturbed by the holder's operation.

(c) In those instances in which the permit, lease, or contract requires the revegetation of an area of land to be affected the mining plan shall show:

(1) Proposed methods of preparation and fertilizing the soil prior to replanting;

(2) Types and mixtures of shrubs, trees, or tree seedlings, grasses or legumes to be planted; and

(3) Types and methods of planting, including the amount of grasses or legumes per acre, or the number and spacing of trees, or tree seedlings, or combinations of grasses and trees.

(d) In those instances in which the permit, lease, or contract requires regrading and backfilling, the mining plan shall show the proposed methods and the timing of grading and backfilling of areas to be affected by the operation.

(e) The mining supervisor or the district manager shall review the mining plan submitted to him by the operator and shall promptly indicate to the operator any changes, additions, or amendments necessary to meet the requirements formulated pursuant to § 23.5, the provisions of the regulations in this part and the terms of the permit, lease, or contract. The operator shall comply with the provisions of an approved mining plan.

(f) A mining plan may be changed by mutual consent of the mining supervisor or the district manager and the operator at any time to adjust to changed conditions or to correct any oversight. To obtain approval of a change or supplemental plan the operator shall submit a written statement of the proposed changes or supplement and the justification for the changes proposed. The mining supervisor or the district manager shall promptly notify the operator that he consents to the proposed changes or supplement or, in the event he does not consent, he shall specify the modifications thereto under which the proposed changes or supplement would be acceptable. After mutual acceptance of a change of a plan the operator shall not depart therefrom without further approval.

(g) If circumstances warrant, or if development of a mining plan for the entire operation is dependent upon unknown factors which cannot or will not be determined except during the progress of the operations, a partial plan may be approved and supplemented from time to time. The operator shall not, however, perform any operation except under an approved plan.

§ 23.9 Performance bond.

(a) (1) Upon approval of an exploration plan or mining plan, the operator shall be required to file a suitable performance bond of not less than \$2,000 with satisfactory surety, payable to the Secretary of the Interior, and the bond shall be conditioned upon the faithful compliance with applicable regulations, the terms and conditions of the permit, lease, or contract, and the exploration or mining plan as approved, amended

or supplemented. The bond shall be in an amount sufficient to satisfy the reclamation requirements of an approved exploration or mining plan, or an approved partial or supplemental plan. In determining the amount of the bond consideration shall be given to the character and nature of the reclamation requirements and the estimated costs of reclamation in the event that the operator forfeits his performance bond.

(2) In lieu of a performance bond an operator may elect to deposit cash or negotiable bonds of the U.S. Government. The cash deposit or the market value of such securities shall be equal at least to the required sum of the bond.

(b) A bond may be a nationwide or statewide bond which the operator has filed with the Department under the provisions of the applicable leasing regulations in Subchapter C of Chapter II of this title, if the terms and conditions thereof are sufficient to comply with the regulations in this part.

(c) The district manager shall set the amount of a bond and take the necessary action for an increase or for a complete or partial release of a bond. He shall take action with respect to bonds for leases or permits only after consultation with the mining supervisor.

§ 23.10 Reports: Inspection.

(a) (1) The holder of a permit or lease under the mineral leasing acts shall file the reports required by this section with the mining supervisor. The holder of a permit or a party to a contract under the Materials Act shall file such reports with the district manager.

(2) The provisions of this section confer authority and impose duties upon mining supervisors with respect to permits or leases issued under the mineral leasing acts and upon district managers with respect to permits issued or contracts made under the Materials Act.

(b) Operations report: Within 30 days after the end of each calendar year, or if operations cease before the end of a calendar year, within 30 days after the cessation of operations, the operator shall submit an operations report containing the following information:

(1) An identification of the permit, lease, or contract and the location of the operation;

(2) A description of the operations performed during the period of time for which the report is filed;

(3) An identification of the area of land affected by the operations and a description of the manner in which the land has been affected;

(4) A statement as to the number of acres disturbed by the operations and the number of acres which were reclaimed during the period of time;

(5) A description of the method utilized for reclamation and the results thereof;

(6) A statement and description of reclamation work remaining to be done.

(c) Grading and backfilling report: Upon completion of such grading and backfilling as may be required by an approved exploration or mining plan, the operator shall make a report thereon and request inspection for approval. Whenever it is determined by such inspection

that backfilling and grading has been carried out in accordance with the established requirements and approved exploration or mining plan, the district manager shall issue a release of an appropriate amount of the performance bond for the area graded and backfilled. Appropriate amounts of the bond shall be retained to assure that satisfactory planting, if required, is carried out.

(d) Planting report: (1) Whenever planting is required by an approved exploration or mining plan, the operator shall file a report with the mining supervisor or district manager whenever such planting is completed. The report shall—

(i) Identify the permit, lease, or contract;

(ii) Show the type of planting or seeding, including mixtures and amounts;

(iii) Show the date of planting or seeding;

(iv) Identify or describe the areas of the lands which have been planted;

(v) Contain such other information as may be relevant.

(2) The mining supervisor or district manager, as soon as possible after the completion of the first full growing season, shall make an inspection and evaluation of the vegetative cover and planting to determine if a satisfactory growth has been established.

(3) If it is determined that a satisfactory vegetative cover has been established and is likely to continue to grow, any remaining portion of the performance bond may be released if all requirements have been met by the operator.

(e) Report of cessation or abandonment of operations: (1) Not less than 30 days prior to cessation or abandonment of operations, the operator shall report his intention to cease or abandon operations, together with a statement of the exact number of acres of land affected by his operations, the extent of reclamation accomplished and other relevant information.

(2) (i) Upon receipt of such report the mining supervisor or the district manager shall make an inspection to determine whether operations have been carried out and completed in accordance with the approved exploration or mining plan.

(ii) Whenever the lands in a permit, lease or contract issued under the mineral leasing acts or the Materials Act are under the jurisdiction of a bureau of the Department of the Interior other than the Bureau of Land Management the mining supervisor or the district manager, as appropriate, shall obtain the concurrence of the authorized officer of such bureau that the operation has been carried out and completed in accordance with the approved exploration or mining plan with respect to the surface protection and reclamation aspects of such plan before releasing the performance bond.

(iii) Whenever the lands in a permit, lease or contract issued under the Mineral Leasing Act of 1920 or the Materials Act are under the jurisdiction of an agency other than the Department of the Interior, the mining supervisor or the district manager, as appropriate, shall consult representatives of the agency administering the lands and obtain their recommendations as to whether the operation has been carried out and completed in accordance with the approved exploration or mining plan, with respect

to the surface protection and reclamation aspects of such plan before releasing the performance bond. If the mining supervisor or district manager, as appropriate, do not concur in the recommendations of the agency regarding compliance with the surface protection and reclamation aspects of the approved exploration or mining plan, the issues shall be referred for resolution to the Under Secretary of the Department of the Interior and the comparable officer of the agency submitting the recommendations. In the case of disagreement on issues which are so referred, the Secretary of the Interior shall make a determination which shall be final and binding. In cases in which the recommendations are not concurred in by the mining supervisor or district manager, the performance bond shall not be released until resolution of the issues or until a final determination by the Secretary of the Interior.

(iv) Whenever the lands in a permit or lease issued under the Mineral Leasing Act for Acquired Lands are under the jurisdiction of an agency other than the Department of the Interior, the mining supervisor or the district manager, as appropriate, shall obtain the concurrence of the authorized officer of such agency that the operation has been carried out and completed in accordance with the approved exploration or mining plan with respect to the surface protection and reclamation aspects of such plan before releasing the performance bond.

§ 23.11 Notice of noncompliance: Revocation.

(a) The provisions of this section confer authority and impose duties upon mining supervisors with respect to permits or leases issued under the mineral leasing acts and upon district managers with respect to permits issued or contracts made under the Materials Act. The mining supervisor shall consult with the district manager before taking any action under this section.

(b) The mining supervisor or district manager shall have the right to enter upon the lands under a permit, lease, or contract, at any reasonable time, for the purpose of inspection or investigation to determine whether the terms and conditions of the permit, lease, or contract, and the requirements of the exploration or mining plan have been complied with.

(c) If the mining supervisor or the district manager determines that an operator has failed to comply with the terms and conditions of a permit, lease, or contract, or with the requirements of an exploration or mining plan, or with the provisions of applicable regulations under this part the supervisor or manager shall serve a notice of noncompliance upon the operator by delivery in person to him or his agent or by certified or registered mail addressed to the operator at his last known address.

(d) A notice of noncompliance shall specify in what respects the operator has failed to comply with the terms and conditions of a permit, lease, or contract, or the requirements of an exploration or mining plan, or the provisions of applicable regulations, and shall specify the action which must be taken to correct the noncompliance and the time limits within which such action must be taken.

(e) Failure of the operator to take action in accordance with the notice of noncompliance shall be grounds for suspension by the mining supervisor or the district manager of operations or for the initiation of action for the cancellation of the permit, lease, or contract and for forfeiture of the performance bond required under § 23.9.

§ 23.12 Appeals.

(a) A person adversely affected by a decision or order of a district manager or of a mining supervisor made pursuant to the provisions of this part shall have a right of appeal to the Director of the Bureau of Land Management whenever the decision appealed from was rendered by a district manager, or to the Director of the Geological Survey if the decision or order appealed from was rendered by a mining supervisor, and the further right to appeal to the Secretary of the Interior from an adverse decision of either Director unless such decision was approved by the Secretary prior to promulgation.

(b) Appeals to Director, Bureau of Land Management, or to Director, Geological Survey, and appeals to the Secretary shall be made pursuant to procedures and requirements of Parts 1840 and 1850 of this title, except that for the purposes of an appeal taken from a decision or order of a mining supervisor made pursuant to this part:

(1) The term "Director" wherever it occurs in Part 1850 or 1850 of this title shall mean the Director of the Geological Survey.

(2) The term "Field Commissioner" shall include a person designated by the Director of the Geological Survey to hold a hearing.

(3) Whenever the provisions of Parts 1840 and 1850 of this title require that a document be filed in the Office of the Director, such documents shall be filed in the Office of the Director, Geological Survey (Address: Director, Geological Survey, Washington, D.C. 20240).

§ 23.12 Appeals.

(a) A person adversely affected by a decision or order of a district manager or of a mining supervisor made pursuant to the provisions of this part shall have a right of appeal to the Board of Land Appeals, Office of the Secretary, whenever the decision appealed from was rendered by a district manager, or to the Director of the Geological Survey if the decision or order appealed from was rendered by a mining supervisor, and the further right to appeal to the Secretary of the Interior from an adverse decision of the Director of the Geological Survey unless such decision was approved by the Secretary prior to promulgation.

(b) Appeals to the Board of Land Appeals shall be made pursuant to Part 1840 of this title. Appeals to the Director of the Geological Survey and appeals from his decisions to the Secretary of the Interior shall be made in the manner provided in 30 CFR 221.66.

(c) In any case involving a permit, lease, or contract for lands under the jurisdiction of an agency other than the Department of the Interior, or a bureau of the Department of the Interior other than the Bureau of Land Management, the officer rendering a decision or order shall designate the authorized officer of such agency as an adverse party on whom a copy of any notice of appeal and any statement of reasons, written arguments, or briefs must be served.

(d) Hearings to present evidence on an issue of fact before a hearing examiner may be ordered by the Board of Land Appeals or the Director of the Geological Survey, as the case may be, in accordance with the procedure set forth in § 1843.5 and Part 1850 of this title.

(c) In any case involving a permit, lease or contract for lands under the jurisdiction of an agency other than the Department of the Interior, or a bureau of the Department of the Interior other than the Bureau of Land Management, the officer rendering a decision or order shall, in the event of an appeal from such decision or order, designate the authorized officer of such agency as an adverse party on whom a copy of a notice of appeal and any statement of reasons, written arguments or briefs must be served.

(d) Hearings to present evidence on an issue of fact before a Field Commissioner designated by the appropriate Director shall be conducted pursuant to the requirements and procedures set forth in Part 1850 of this title.

§ 23.13 Consultation.

Whenever the lands included in a permit, lease, or contract are under the jurisdiction of an agency other than the Department of the Interior or under the jurisdiction of a bureau of the Department of the Interior other than the Bureau of Land Management, the mining supervisor or the district manager, as appropriate, shall consult the authorized officer of such agency before taking any final action under §§ 23.7, 23.8, 23.10 (c) and (d) (2) and (3), and 23.11(c).

DAVID S. BLACK,
Under Secretary of the Interior.

JANUARY 15, 1969.

[F.R. Doc. 69-747; Filed, Jan. 17, 1969;
8:51 a.m.]

APPENDIX 11

Prospecting Permit

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE

PROSPECTING PERMIT

(Act of June 4, 1897)

(Ref: FSM 2821)

FILE REFERENCE

NAME OF PERMITTEE

DATE OF APPLICATION

Permission is hereby granted to _____
of _____
to use the following-described lands: _____

(Describe the lands to be occupied with reference to a Government survey,

State-grant road, stream, or well-known landmark)

for the purpose of making excavations, drilling shot holes, or doing other work thereon necessary for determining whether there are mineral deposits of such a quantity and value as would warrant application to the Bureau of Land Management, Department of the Interior, for a prospecting permit granting a preference right to lease or a mining lease authorizing exploitation and development of the mineral resources; and erecting such temporary structures and facilities as are requisite thereto.

This permit is granted subject to all valid claims to the described lands, and to the following conditions:

1a. The permittee shall pay in advance to the Forest Service, U. S. Department of Agriculture, an annual rental in the sum of \$ _____.*

1b. The permittee shall pay to the Forest Service, U. S. Department of Agriculture, the sum of \$ _____ for each shot hole drilled, such payments to be tendered in advance of drilling in units of five or more, except for a final or single payment, which may be for one or more holes.*

*Strike out 1a or 1b, whichever is inapplicable.

2. The permittee, in exercising the privileges granted by this permit, shall comply with the regulations of the Department of Agriculture and all Federal, State, county, and municipal laws, ordinances, or regulations which are applicable to the area or operations covered by this permit, including, but not limited to, those pertaining to fire, sanitation, fish, and game.

3. This permit is accepted subject to the conditions set forth herein, and to conditions _____ to _____ attached hereto and made a part of this permit.

PERMITTEE	NAME OF PERMITTEE	SIGNATURE OF AUTHORIZED OFFICER	DATE
		TITLE	
ISSUING OFFICER	NAME AND SIGNATURE	TITLE	DATE

(CONTINUED ON REVERSE)

2800-1 (8/70)

4. This permit does not grant any exclusive right to the use of the described lands for prospecting, or other purposes; the area herein described shall be subject at all times to any other lawful uses by the United States, its lessees, permittees, licensees, and assigns.

5. This permit does not grant any rights of any kind in minerals; nor does it grant any preference right of any nature whatsoever in the issuance of a permit or lease for the exploration, removal, or development of the mineral resources in the described lands.

6. The permittee shall take all reasonable precaution to prevent and suppress forest fires. Particularly in connection with operations under this permit, fire prevention and fire-fighting equipment as required by the Forest Supervisor shall be provided, and the burning or other disposal of brush and other inflammable debris shall be done by the permittee in accordance with written stipulations to be issued by the Forest Supervisor.

7. No national forest timber may be cut or destroyed without first obtaining a permit from the forest officer in charge.

8. The permittee will exercise diligence in protecting from damage the land and property of the United States covered by and used in connection with this permit and will pay the United States for any damage resulting from the violation of the terms of this permit or any law or regulation applicable to the national forests by the permittee, his agents, or employees, or through negligence of the permittee, his agents, or employees, when acting within the scope of their employment.

9. The permittee shall safeguard with fences, barriers, fills, covers, or other effective devices, any shafts, pits, tunnels, cuts, and other excavations which otherwise would unduly imperil the lives, safety, or property of other persons.

10. Upon abandonment, termination, or revocation of this permit, the permittee shall remove all structures and facilities which have been placed on the premises by him, and shall restore the site, unless otherwise agreed upon in writing or in this permit.

11. This permit may be terminated upon breach of any of the conditions herein or at the discretion of the Forest Supervisor or Regional Forester.

12. The permittee shall fully repair all damage, other than ordinary wear and tear, to roads and trails in the national forests caused by the permittee in the exercise of the privilege granted by this permit.

13. In case of change of address, permittee shall immediately notify the Forest Supervisor.

14. No Member of or Delegate to Congress or Resident Commissioner shall be admitted to any share or part of this permit or to any benefit that may arise therefrom, but this provision shall not be construed to extend to this permit if made with a corporation for its general benefit.

15. The conditions of this permit are completely set forth herein and none of its terms can be varied or modified except in writing by the forest officer issuing the permit, his successor, or superior, and in accordance with applicable law and the regulations of the Secretary of Agriculture.

16. In the event of any conflict between any of the preceding printed clauses or any provision thereof and any of the following clauses or any provision thereof, the following clauses will control.

APPENDIX 12

Before prospecting operations begin, the permittee will submit to the Forest Supervisor for approval an operating plan for prospecting. This operating plan will include:

- a. areas to be prospected and located in prior permits
- b. methods of prospecting and other activities
- c. location, construction and maintenance of roads
- d. erosion control measures to be taken
- e. revegetation plan
- f. other information deemed necessary by the Forest Supervisor

Submitted or amended plans will be submitted for review and approval by the Forest Supervisor when desired by the permittee or when called for by the Forest Supervisor.

2. The permittee will furnish and maintain with the Forest Service a bond in the sum of _____ in accordance with the terms and conditions of the permit. The bond shall be in the sum of _____ in the event of a violation of the permit.

U.S. Forest Service

Special Stipulations for Prospecting Permit

3. In the event the permittee desires location for placer claims on any lands under this permit, the Forest Service reserves the right to require in such cases before granting stipulations to protect surface rights.

Permittee

Special Stipulations

1. Before prospecting operations begin, the permittee will submit to the Forest Supervisor for approval an operating plan for prospecting. This operating plan will include:

- a. area to be prospected and location of pilot plants
- b. methods of prospecting and pilot studies
- c. location, construction and maintenance of roads
- d. erosion control measures to be taken
- e. rehabilitation plans
- f. other information deemed necessary by the Forest Service

Revised or amended plans will be submitted for review and approval by the Forest Supervisor when desired by the permittee or when called for by the Forest Supervisor.

2. The permittee shall furnish and maintain with the Forest Service a bond in the sum of _____ conditioned upon compliance with the terms and conditions of this permit, and to increase the amount thereof or furnish such other bond as may be required.
3. In the event the permittee makes application for mining lease on any lands under this permit, the Forest Service reserves the right to include in such mining lease special stipulations to protect surface values.

Permittee

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Land Office and Serial Number

PHOSPHATE PROSPECTING PERMIT

The Bureau of Land Management, pursuant to the Act of February 25, 1920 (41 Stat. 437; 30 U.S.C. 181, *et seq.*), as amended, and subject to all reasonable regulations of the Secretary of the Interior now or hereafter in force, when not inconsistent with any express and specific provisions herein, which are made a part hereof, hereby grants to

the exclusive right for a period of two years from date hereof to prospect for phosphate deposits, including associated minerals, on the following-described lands in the State of

Sec. 1. *Prospecting.* Permittee shall prospect the lands by core drilling or other acceptable methods, and prior to commencement of prospect work shall notify the Regional Mining Supervisor of the United States Geological Survey of the region in which the permit lands are situated.

Sec. 2. *Removal of deposits.* Permittee shall remove from the lands only such deposits as may be necessary to experimental work or to establish the existence of valuable phosphate deposits within the permit area.

Sec. 3. *Rental and royalty.* (a) Permittee must pay an annual rental of 25 cents per acre or fraction thereof covered by this permit, *but not less than \$20 per year.* The annual rental payment shall be made *on or before* the anniversary date of the permit.

(b) Permittee must pay royalty of 12½ percent of the gross value of the output of *all* phosphate deposits and associated minerals at the point of shipment to market. However, during pendency of a lease application under Section 6 hereof, permittee must pay royalty at the rate of 12½ percent on deposits mined and disposed of, subject to credit in the event a lease issues at a lower rate. If the lease application is finally rejected, the royalty rate for the deposits mined shall be

12½ percent. Payment of royalty *must be made not later* than the end of the month succeeding that during which the deposits were disposed of.

(c) Unless otherwise directed, payment of rental and royalty must be made to the order of the Bureau of Land Management at the proper places prescribed by the regulations, 43 CFR 3001.0-6.

Sec. 4. *Extension of permit.* (a) This permit is subject to an extension of an additional period, not in excess of four years, upon approval of the authorized officer of the Bureau of Land Management and upon the showing and conditions prescribed in 43 CFR 3161.3-5.

(b) Application for extension of this permit must be filed in *duplicate* in the proper land office within the period beginning 90 days prior to the date of expiration of the permit. Unless such an application is filed within the time specified, this permit will expire without notice to the permittee.

Sec. 5. *Operating regulations.* Permittee shall comply with the provisions of the operating regulations of the Geological Survey (30 CFR Part 231) and all reasonable orders issued pursuant thereto. Copies may be obtained from the Regional Mining Supervisor.

Sec. 6. *Reward for discovery.* (a) Permittee is entitled to a preference right lease if he shall have discovered valuable deposits of phosphate within the permit area, and within the period of this permit as issued, or as extended. The showing required to be made in a lease application is set forth in 43 CFR 3161.3-9. For limitation on acreage holdings see 43 CFR 3161.1(a)(1).

(b) Application for a preference right lease must be filed in the proper land office not later than 30 days after the permit expires.

Sec. 7. *Nondiscrimination clauses.* During the performance of this contract, the permittee agrees as follows:

(a) The permittee will not discriminate against any employee or applicant for employment because of race, creed, color, or national origin. The permittee will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, creed, color, or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The permittee agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the contracting officer setting forth the provisions of this nondiscrimination clause.

(b) The permittee will, in all solicitations or advertisements for employees placed by or on behalf of the permittee, state that all qualified applicants will receive consideration for employment without regard to race, creed, color, or national origin.

(c) The permittee will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the agency contracting officer, advising the said labor union or workers' representative of the permittee's commitments under this Section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(d) The permittee will comply with all provisions of Executive Order No. 10925 of March 6, 1961, as amended, and of the rules, regulations, and relevant orders of the President's Committee on Equal Employment Opportunity created thereby.

(f) The permittee will furnish all information and reports required by Executive Order No. 10925 of March 6, 1961, as amended, and by the rules, regulations, and orders of the said Committee, or pursuant thereto, and will permit access to his books, records, and accounts by the contracting agency and the Committee for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(g) In the event of the permittee's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be cancelled, terminated, or suspended in whole or in part and the permittee may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order No. 10925 of March 6, 1961, as amended,

and such other sanctions may be imposed and remedies invoked as provided in the said Executive Order or by rule, regulation, or order of the President's Committee on Equal Employment Opportunity, or as otherwise provided by law.

(h) The permittee will include the provisions of paragraphs (a) through (h) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the President's Committee on Equal Employment Opportunity issued pursuant to Section 303 of Executive Order No. 10925 of March 6, 1961, as amended, so that such provisions will be binding upon each subcontractor or vendor. The permittee will take such action with respect to any subcontract or purchase order as the contracting agency may direct as a means of enforcing such provisions, including sanctions for noncompliance: *Provided, however,* that in the event the permittee becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the contracting agency, the permittee may request the United States to enter into such litigation to protect the interests of the United States.

Sec. 8. *Assignment.* This permit, or any interest therein may not be assigned or transferred without the approval of the authorized officer of the Bureau of Land Management, whether by direct assignment, operating agreement, sublease, working or royalty interest, or otherwise. The rules on assignments and transfers, and the limitations against creation of overriding royalty interest, are set forth in 43 CFR 3164.1 and 3164.2. All assignments of record title must be filed in duplicate in the proper land office within 90 days from date of execution.

Sec. 9. *Surface use restrictions.* (a) Permittee shall conduct operations in such a way as not to interfere with the administration and use of the land to a greater extent than may be determined by the authorized officer of the Bureau of Land Management to be necessary for the most beneficial use of the lands in case any thereof are embraced in a forest, reclamation, power, or other withdrawal or are segregated for any particular purpose.

(b) Permittee shall take reasonable steps as may be needed to prevent operations from unnecessarily: (1) causing or contributing to soil erosion or damaging any forage and timber growth; (2) polluting the waters of springs, streams, wells, or reservoirs; (3) damaging crops, including forage, timber or improvements of a surface owner; or (4) damaging range improvements whether owned by the United States or by its grazing permittees or lessees.

(c) Upon any partial or total relinquishment of the cancellation or expiration of this permit, or at any other time prior thereto when required or when deemed necessary by the Government, the permittee shall fill any sump holes, ditches and other excavations, remove or cover all debris, and so far as reasonably possible, restore the surface to its former condition, including the removal of structures as and if required. The Government may prescribe the steps to be taken and restoration to be made with respect to lands of the United States and improvements thereon.

(Signature of Signing Officer)

(Date)

(Title)

GPO 849-561

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

PHOSPHATE PROSPECTING PERMIT

Land Office

Serial Number

The Bureau of Land Management, pursuant to the act of February 25, 1920 (41 Stat. 437, 30 U.S.C. 181, et seq.), as amended, and subject to all reasonable regulations of the Secretary of the Interior now or hereafter in force, when not inconsistent with any express and specific provisions herein, which are made a part hereof, hereby grants to

the exclusive right for a period of two years from date hereof to prospect for phosphate deposits, including associated minerals, on the following-described lands in the State of

Sec. 1. Prospecting. Permittee shall prospect the lands by core drilling or other acceptable methods, and prior to commencement of prospect work shall notify the Regional Mining Supervisor of the United States Geological Survey of the region in which the permit lands are situated.

Sec. 2. Removal of deposits. Permittee shall remove from the lands only such deposits as may be necessary to experimental work or to establish the existence of valuable phosphate deposits within the permit area.

Sec. 3. Rental and royalty. (a) Permittee must pay an annual rental of 25 cents per acre or fraction thereof covered by this permit, *but not less than \$20 per year*. The annual rental payment shall be made *on or before* the anniversary date of the permit.

(b) Permittee must pay royalty of 12½ percent of the gross value of the output of *all* phosphate deposits and associated minerals at the point of shipment to market. However, during pendency of a lease application under section 6 hereof, Permittee must pay royalty at the rate of 12½ percent on deposits mined and disposed of, subject to credit in the event a lease issues at a lower rate. If the lease application is finally rejected, the royalty rate for the deposits

mined shall be 12½ percent. Payment of royalty *must be made not later* than the end of the calendar month succeeding that during which the deposits were disposed of.

(c) Unless otherwise directed, payment of rental and royalty must be made to the order of the Bureau of Land Management at the proper places prescribed by the regulations, 43 CFR 196.12(a).

Sec. 4. Extension of permit. (a) This permit is subject to an extension of an additional period, not in excess of four years, upon approval of the Authorized Officer of the Bureau of Land Management and upon the showing and conditions prescribed in 43 CFR 196.9.

(b) Application for extension of this permit must be filed in *duplicate* in the proper land office within the period beginning 90 days prior to the date of expiration of the permit. Unless such an application is filed within the time specified, this permit will expire without notice to the Permittee.

Sec. 5. Operating regulations. Permittee shall comply with the provisions of the operating regulations of the Geological Survey (30 CFR Part 231), and all reasonable orders issued pursuant thereto. Copies may be obtained from the Regional Mining Supervisor.

Sec. 6. *Reward for discovery.* (a) Permittee is entitled to a preference right lease if he shall have discovered valuable deposits of phosphate within the permit area, and within the period of this permit as issued, or as extended. The showing required to be made in a lease application is set forth in 43 CFR 196.11. For limitation on acreage holdings see 43 CFR 196.2(a)(1).

(b) Application for a preference right lease must be filed in the proper land office *not later than 30 days after the permit expires.*

Sec. 7. *Nondiscrimination clauses.* In connection with the performance of work under this permit, the Permittee agrees as follows:

(a) The Permittee will not discriminate against any employee or applicant for employment because of race, creed, color, or national origin. The Permittee will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, creed, color, or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Permittee agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the contracting officer setting forth the provisions of this non-discrimination clause.

(b) The Permittee will, in all solicitations or advertisements for employees placed by or on behalf of the Permittee, state that all qualified applicants will receive consideration for employment without regard to race, creed, color, or national origin.

(c) The Permittee will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the agency contracting officer, advising the said labor union or workers' representative of the Permittee's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(d) The Permittee will comply with all provisions of Executive Order No. 10925 of March 6, 1961, and of the rules, regulations, and relevant orders of the President's Committee on Equal Employment Opportunity created thereby.

(e) The Permittee will furnish all information and reports required by Executive Order No. 10925 of March 6, 1961, and by the rules, regulations, and orders of the said Committee, or pursuant thereto, and will permit access to his books, records, and accounts by the contracting agency and the Committee for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(f) In the event of the Permittee's non-compliance with the nondiscrimination clause of this permit or with any of the said rules, regulations, or orders, this permit may be cancelled in whole or in part and the Permittee may be declared ineligible for further government permits in accordance with procedures authorized in Executive Order No. 10925 of

March 6, 1961, and such other sanctions may be imposed and remedies invoked as provided in the said Executive Order or by rule, regulation, or order of the President's Committee on Equal Employment Opportunity, or as otherwise provided by law.

(g) The Permittee will include the provisions of the foregoing paragraphs (a) through (f) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the President's Committee on Equal Employment Opportunity issued pursuant to section 303 of Executive Order No. 10925 of March 6, 1961, so that such provisions will be binding upon each subcontractor or vendor. The Permittee will take such action with respect to any subcontract or purchase order as the contracting agency may direct as a means of enforcing such provisions, including sanctions for non-compliance: *Provided, however,* that in the event the Permittee becomes involved in, or is threatened with litigation with a subcontractor or vendor as a result of such direction by the contracting agency, the Permittee may request the United States to enter into such litigation to protect the interests of the United States.

Sec. 8. *Assignment.* This permit, or any interest therein may not be assigned or transferred without the approval of the Authorized Officer of the Bureau of Land Management, whether by direct assignment, operating agreement, sublease, working or royalty interest, or otherwise. The rules on assignments and transfers, and the limitations against creation of overriding royalty interest, are set forth in 43 CFR 196.22 and 196.23. All assignments of record title must be filed in *duplicate* in the proper land office within 90 days from date of execution.

Sec. 9. *Surface use restrictions.* (a) Permittee shall conduct operations in such a way as not to interfere with the administration and use of the land to a greater extent than may be determined by the Authorized Officer of the Bureau of Land Management to be necessary for the most beneficial use of the lands in case any thereof are embraced in a forest, reclamation, power, or other withdrawal or are segregated for any particular purpose.

(b) Permittee shall take reasonable steps as may be needed to prevent operations from unnecessarily: (1) causing or contributing to soil erosion or damaging any forage and timber growth; (2) polluting the waters of springs, streams, wells, or reservoirs; (3) damaging crops, including forage, timber or improvements of a surface owner; or (4) damaging range improvements whether owned by the United States or by its grazing permittees or lessees.

(c) Upon any partial or total relinquishment of the cancellation or expiration of this permit, or at any other time prior thereto when required or when deemed necessary by the Government, the Permittee shall fill any sump holes, ditches and other excavations, remove or cover all debris, and so far as reasonably possible, restore the surface to its former condition, including the removal of structures as and if required. The Government may prescribe the steps to be taken and restoration to be made with respect to lands of the United States and improvements thereon.

(Signing Officer)

(Date)

(Title)

APPENDIX 14

U.S. Department of Interior (B.L.M.)

Phosphate Lease Form (3160-1)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

PHOSPHATE LEASE

Land Office Serial Number

This lease, entered into as of the first day of

, by the United States of America,

the lessor, and

, as lessee,
pursuant and subject to the terms and provisions of the Act of February 25, 1920 (41 Stat. 437), as amended, hereinafter referred to as the Act, and to all reasonable regulations of the Secretary of the Interior now or hereafter in force when not inconsistent with any express and specific provisions herein, which are made a part hereof.

WITNESSETH:

Sec. 1. *Rights of lessee.* That the lessor, in consideration of rents and royalties to be paid, and the conditions and covenants to be observed as herein set forth, does hereby grant and lease to the lessee the exclusive right and privilege to mine and dispose of all the phosphate and phosphate rock and associated and related minerals hereinafter referred to as leased deposits in, upon, or under the following-described tracts of land situated in the State of

containing _____ acres, more or less, together with the right to construct all such works, buildings, plants, structures, and appliances as may be necessary and convenient for the mining and preparation of the leased deposits for market, the manufacture of products thereof, the housing and welfare of employees, and, subject to the conditions herein provided, including the royalties set forth in Sec. 2(b) hereof, to use any deposit of silica, limestone, or other rock situated on the leased lands as may be utilized in the processing or refining of the leased deposits and so much of the surface of the lands as may reasonably be required in the exercise of the rights and privileges granted.

Sec. 2. In consideration of the foregoing, the lessee hereby agrees:

(a) *Bond.* To maintain the bond furnished upon the issuance of the lease, which bond is conditioned upon compliance with the terms and provisions of this lease, or to furnish such other bond as may be required.

(b) *Royalty.* To pay the lessor a royalty of _____ percent of the gross value of the output of leased deposits at the mine, which royalty shall be not less than _____ cents per ton of 2,000 pounds. In addition to the other royalties and rentals provided in this lease, the lessee shall also pay to the lessor a royalty of _____ per ton for so much of any deposit of silica or limestone or other rock situated on the leased lands as may be

utilized in the processing or refining of the leased deposits or of deposits from other lands. It is expressly understood that the Secretary of the Interior may establish reasonable minimum values for the purpose of computing royalty on any of the leased deposits, due consideration being given to the highest price paid for a part or a majority of the production of like quality products from the same general area, the price received by the lessee, posted prices and other relevant matters. Royalties shall be payable monthly within 30 days from the expiration of each month in which the leased deposits are mined and transported from the leased land.

(c) *Rental.* To pay the lessor annually, in advance, for each acre or fraction thereof, beginning with the

date of execution of this lease, the following rentals: 25 cents per acre for the first year; 50 cents per acre for the second and third years, respectively; and \$1 per acre for the fourth and each succeeding year during the continuance of the lease, such rental for any year to be credited against the royalties on the leased deposits as they accrue under the lease during the year for which the rental was paid.

(d) *Minimum production.* To prospect diligently the leased lands and beginning with the fourth year of the lease, except when operations are interrupted by strikes, the elements, or casualties not attributable to the lessee, or unless operations are suspended as provided in Sec. 39 of the Act, to mine each year the leased deposits from any of the lands covered by this lease to a royalty value of \$1 per acre or fraction thereof in lieu of mining, pay a minimum royalty of \$1 an acre or fraction thereof. The lessee may, at any time prior to the end of the thirtieth month of this lease, file a petition with the Regional Mining Supervisor of the United States Geological Survey, to have the minimum production specified herein changed to a lesser figure, supporting such petition by the required showing and if the fact warrant such action, the lessor will change the requirement to a lesser figure.

(e) *Payments.* To make rental payments to the Manager of the appropriate Land Office, except that when this lease becomes productive the rentals and royalties shall be paid to the appropriate Regional Mining Supervisor of the United States Geological Survey, with whom all reports concerning operations under the lease shall be filed. All remittances to the Manager of the Land Office shall be made payable to the Bureau of Land Management, those to the Geological Survey shall be made payable to the United States Geological Survey.

(f) *Plats, reports, maps.* At such times and in such form as the lessor may prescribe, to furnish a plat showing development work and improvements on the leased lands and a report with respect to stockholders, investment, depreciation, and costs. To furnish in such form as the lessor may prescribe, within 30 days from the expiration of each month, a report covering such month, certified by the superintendent of the mine, or by such other agent having personal knowledge of the facts as may be designated by the lessee for such purpose, showing the amount of leased deposits and silica, limestone, or other rock mined during the month, the character and quality thereof, amount of its products and byproducts disposed of and price received therefor, and amount in storage or held for sale. To keep and prepare maps of the leased lands in accordance with the appropriate regulations.

(g) *Weights.* To determine accurately the weight or quantity and quality of all leased deposits and silica, limestone, or other rock mined, and to enter accurately the weight or quantity and quality thereof in due form in books to be kept and preserved by the lessee for such purposes.

(h) *Inspection.* To permit at all reasonable times (1) inspection by any duly authorized officer of the Department, of the leased premises and all surface and underground improvements, works, machinery, equipment, and all books, and records pertaining to operations and surveys or investigations under this lease, and (2) the lessor to make copies of and extracts from any or all books and records pertaining to operations under this lease, if desired.

(i) *Assignment.* To file for approval in the appropriate Land Office within 90 days from the date of execution, any assignment or transfer made of this lease, whether by direct assignment, operating agreement, working or royalty interest, or otherwise. Such instrument will take effect the first day of the month

following its approval by the authorized officer of the Bureau of Land Management, or if the assignee requests, the first day of the month of approval. The showing required to be made with an assignment or transfer is set forth in the appropriate regulations.

(j) *Equal Opportunity Clause.* During the performance of this contract, the lessee agrees as follows:

(1) The lessee will not discriminate against any employee or applicant for employment because of race, creed, color, or national origin. The lessee will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, creed, color, or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The lessee agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the contracting officer setting forth the provisions of this nondiscrimination clause.

(2) The lessee will, in all solicitations or advertisements for employees placed by or on behalf of the lessee, state that all qualified applicants will receive consideration for employment without regard to race, creed, color, or national origin.

(3) The lessee will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the agency contracting officer, advising the labor union or workers' representative of the lessee's commitments under Sec. 202 of Executive Order No. 11246 of September 24, 1965, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(4) The lessee will comply with all provisions of Executive Order No. 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.

(5) The lessee will furnish all information and reports required by Executive Order No. 11246 of September 24, 1965, and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(6) In the event of the lessee's noncompliance with the nondiscrimination clauses of this contract or with any of such rules, regulations, or orders, this contract may be cancelled, terminated or suspended in whole or in part and the lessee may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order No. 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order No. 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

(7) The lessee will include the provisions of Paragraphs (1) through (7) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Sec. 204 of Executive Order No. 11246, of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The lessee will take such action with respect to any subcontract or purchase order as the contracting agency may direct as a means of enforcing such provisions including sanctions for noncompliance: *Provided, however,* That in the event the lessee becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the contracting agency, the lessee may request the United States to enter into such litigation to protect the interests of the United States.

(k) *Lands patented with phosphate deposits reserved to the United States.* To comply with all statutory requirements and regulations thereunder, if the lands embraced herein have been or shall hereafter be disposed of under the laws reserving to the United States the deposits of phosphate therein, subject to such conditions as are or may hereafter be provided by the laws reserving such phosphate.

(l) *Operations, wages, freedom of purchase.* To exercise reasonable diligence, skill, and care in the operation of the property, and carry on all operations in accordance with approved methods and practices as provided in the operating regulations, having due regard for the prevention of injury to life, health or property, and of waste or damage to any water or mineral deposits; to pay all wages due miners and employees, both above and below ground, at least twice each month in lawful money of the United States; to accord all miners and employees complete freedom of purchase, to restrict the workday not to exceed eight (8) hours in any one day for underground workers, *except* in cases of emergency; to employ no boy under the age of 16 and no girl or woman, without regard to age, in any mine below the surface; unless the laws of the State otherwise provide, in which case the State laws control.

(m) *Taxes.* To pay when due, all taxes lawfully assessed and levied under the laws of the State or the United States upon improvements, output of mines, or other rights, property, or assets of the lessee.

(n) *Delivery of premises in case of forfeiture.* To deliver up to the lessor in good order and condition the land leased, including all buildings, underground timbering, and such other supports and structures as are necessary for the preservation of the mine.

Sec. 3. The lessor expressly reserves:

(a) *Rights reserved.* The right to permit for joint or several use easements or rights-of-way, including easements in tunnels upon, through, or in the land leased, occupied, or used as may be necessary or appropriate to the working of the same or other lands containing the deposits described in the Act, and the treatment and shipment of the products thereof by or under authority of the Government, its lessees, or permittees, and for other public purposes.

(b) *Disposition of surface.* The right to lease, sell, or otherwise dispose of the surface of any of the lands embraced within this lease which are owned by the United States under existing law or laws hereafter enacted, insofar as said surface is not necessary for the use of the lessee in the mining and removal of the leased deposits, associated and related minerals, and to lease other mineral deposits in the lands.

(c) *Protection of the surface, natural resources, and improvements.* The lessee agrees to take such reasonable steps as may be needed to prevent operations from unnecessarily: (1) causing or contributing to soil erosion or damaging any forage and timber growth thereon; (2) polluting the waters of springs, streams, wells, or reservoirs; (3) damaging crops, including forage, timber, or improvements of a surface owner; or (4) damaging range improvements whether owned by the United States or by its grazing permittees or lessees; and upon any partial or total relinquishment or the cancellation or expiration of this lease, or at any other time prior thereto when required by the lessor and to the extent deemed necessary by the lessor, to fill any sump holes, ditches and other excavations, remove or cover all debris, and, so far as reasonably possible, restore the surface of the leased land to its former condition, including the removal of structures as and if required. The lessor may prescribe the steps to be taken and restoration to be made with respect to lands of the United States and improvements thereon.

(d) *Monopoly and fair prices.* Full power and authority to promulgate and enforce all orders necessary to insure the sale of the production of the leased lands to the United States and to the public at reasonable prices, to protect the interest of the United States, to prevent monopoly, and to safeguard the public welfare.

(e) *Readjustment of terms.* The right reasonably to readjust and fix the royalties payable hereunder and other terms and conditions, including amount of minimum annual production, at the end of 20 years from the date hereof, and thereafter at the end of each succeeding 20-year period during the continuance of this lease unless otherwise provided by law at the time of the expiration of any such period, but in case the lessee be dissatisfied with the rate of royalty or other terms and conditions so fixed, he shall be entitled to surrender this lease in the manner and under the conditions provided in Secs. 4 and 5 hereof.

(f) *Waiver of conditions.* The right to waive any breach of the covenants and conditions contained herein *except* such as are required by the Act, but any such waiver: shall extend only to the particular breach so waived and shall not limit the rights of the lessor with respect to any future breach; nor shall the waiver of a particular cause of forfeiture prevent cancellation of this lease for any other cause, or for the same cause occurring at another time.

Sec. 4. Relinquishment of lease. Upon a satisfactory showing that the public interest will not be impaired, the lessee may surrender the entire lease or any legal subdivision thereof. A relinquishment must be filed in duplicate in the appropriate Land Office. Upon its acceptance, it shall be effective as of the date it is filed, subject to the continued obligations of the lessee and his surety to make payment of all accrued rentals and royalties and to provide for the preservation of any mines or productive works or permanent improvements on the leased lands in accordance with the regulations and terms of the lease.

Sec. 5. Removal of equipment, etc., on termination of lease. That on termination of this lease, by surrender or forfeiture, the lessee shall have the privilege at any time within a period of 90 days thereafter of removing from the premises all machinery, equipment, tools, and materials, other than underground timbering placed by the lessee in or on the leased lands, which are not necessary for the preservation of the mine. Any materials, tools, appliances, machinery, structures, and equipment, subject to removal as above provided which are allowed to remain on the leased lands shall become the property of the lessor on expiration of the 90-day period or such extension thereof as may be granted because of adverse climatic conditions throughout said period, provided that the lessee shall remove any or all of such property where so directed by the lessor.

Sec. 6. Proceedings in case of default. If the lessee shall not comply with any of the provisions of the Act or the regulations thereunder or default in the performance or observance of any of the terms, covenants, and stipulations hereof and such default shall continue for a period of 30 days after service of written notice thereof by the lessor, the lessor may institute appropriate proceedings in a court of competent jurisdiction for the forfeiture and cancellation of this lease as provided in Sec. 31 of the Act, provided that if this lease has not been issued under competitive bidding, as to any default not corrected prior to the commencement of production, the lessor may cancel such lease without institution of such court proceedings. Furthermore, if the lessee fails to take prompt and necessary steps to prevent loss or damage to the mine, property, or premises, or danger to the employees, the lessor may enter on the premises

and take such measures as may be deemed necessary to prevent such loss or damage or to correct the dangerous or unsafe condition of the mine or works thereof, which shall be at the expense of the lessee: *Provided*, that the lessee shall not be held responsible for delays or casualties occasioned by causes beyond the lessee's control.

Sec. 7. *Heirs and successors in interest.* Each obligation hereunder shall extend to and be binding upon, and every benefit hereof shall inure to the heirs, executors, administrators, successors, or assigns of the respective parties hereto.

Sec. 8. *Unlawful interest.* No Member of, or Delegate to Congress, or Resident Commissioner, after his election or appointment, or either before or after he has qualified and during his continuance in office, and no officer, agent, or employee of the Department of the Interior, except as provided in 43 CFR 7.4(a)(1), shall be admitted to any share or part in this lease or derive any benefit that may arise therefrom; and the provisions of Section 3741 of the Revised Statutes of the United States (41 U.S.C. Sec. 22), as amended, and Sections 431, 432, and 433, Title 18 U.S.C., relating to contracts, enter into and form a part of this lease so far as the same may be applicable.

THE UNITED STATES OF AMERICA

By _____
(Signing Officer)

(Title)

(Date)

WITNESSES TO SIGNATURE OF LESSEE

(Signature of Lessee)

(Signature of Lessee)

(Signature of Lessee)

If this lease is executed by a corporation, it must bear the corporate seal

GPO 820-426

U.S. Department
Stipulation
Jurisdiction of De

Interior (B.L.M.)
r Lands Under
rtment of Agriculture

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

STIPULATION FOR LANDS UNDER JURISDICTION OF DEPARTMENT OF AGRICULTURE *

The lands embraced in this lease or permit being under the jurisdiction of the Secretary of Agriculture, the lessee or permittee hereby agrees:

(1) To conduct all operations authorized by this lease or permit with due regard for good land management, not to cut or destroy timber without first obtaining permission from the authorized representative of the Secretary of Agriculture, and to pay for all such timber cut or destroyed at the rates prescribed by such representative; to avoid unnecessary damage to improvements, timber, crops, or other cover; unless otherwise authorized by the Secretary of Agriculture, not to drill any well, carry on operations, make excavations, construct tunnels, drill, or otherwise disturb the surface of the lands within 200 feet of any building standing on the lands and whenever required, in writing, by the authorized representative of the Secretary of Agriculture to fence or fill all sump holes, ditches, and other excavations, remove or cover all debris, and so far as reasonably possible, restore the surface of the lands to their former condition, including the removal of structures as and if required, and when required by such representative to bury all pipelines below plow depth.

(2) To do all in his power to prevent and suppress forest, brush, or grass fires on the lands and in their vicinity, and to require his employees, contractors, subcontractors, and employees of contractors or subcontractors to do likewise. Unless prevented by circumstances over which he has no control, the lessee or permittee shall place his employees, contractors, subcontractors, and employees of contractors and subcontractors employed on the lands at the disposal of any authorized officer of the Department of Agriculture for the purpose of fighting forest, brush, or grass fires on or originating on the lands or on adjacent areas or caused by the negligence of the lessee or permittee or his employees, contractors, subcontractors and employees of contractors and subcontractors, with the understanding that payment for such services shall be made at rates to be determined by the authorized representative of the Secretary of

Agriculture, which rates shall not be less than the current rates of pay prevailing in the vicinity for services of a similar character: *Provided*, that if the lessee or permittee, his employees, contractors, subcontractors, or employees of contractors or subcontractors, caused or could have prevented the origin or spread of said fire or fires, no payment shall be made for services so rendered.

During periods of serious fire danger to forest, brush, or grass, as may be specified by the authorized representative of the Secretary of Agriculture, the lessee or permittee shall prohibit smoking and the building of camp and lunch fires by his employees, contractors, subcontractors, and employees of contractors or subcontractors within the area involved except at established camps, and shall enforce this prohibition by all means within his power: *Provided*, that the authorized representative of the Secretary of Agriculture may designate safe places where, after all inflammable material has been cleared away, campfires may be built for the purpose of heating lunches and where, at the option of the lessee or permittee, smoking may be permitted.

The lessee or permittee shall not burn rubbish, trash, or other inflammable materials *except* with the consent of the authorized representative of the Secretary of Agriculture and shall not use explosives in such a manner as to scatter inflammable materials on the surface of the lands during the forest, brush, or grass fire season, *except* as authorized to do so or on areas approved by such representative.

The lessee or permittee shall build or construct such fire lines or do such clearing on the lands as the authorized representative of the Secretary of Agriculture decides is essential for forest, brush, and grass fire prevention which is or may be necessitated by the

* This form of stipulation may be used in connection with leases and permits issued under the Acts of February 25, 1920, as amended (30 U.S.C. 181 *et seq.*); August 7, 1947 (30 U.S.C. 351 *et seq.*); February 7, 1927, as amended (30 U.S.C. 231 *et seq.*); April 17, 1926, as

amended (30 U.S.C. 271 *et seq.*); June 28, 1944 (58 Stat. 483-485); September 1, 1949 (30 U.S.C. 192c); June 30, 1950 (16 U.S.C. 508b); or under the authority of any of the Acts cited in Section 402 of the President's Reorganization Plan No. 3 of 1946 (5 U.S.C. 133y-16, Note).

exercise of the privileges authorized by this lease or permit, and shall maintain such fire tools at his headquarters or at the appropriate location on the lands as are deemed necessary by such representative.

(3) In the location, design, construction, and maintenance of all authorized works, buildings, plants, waterways, roads, telegraph or telephone lines, pipelines, reservoirs, tanks, pumping stations, or other structures or clearance, the lessee or permittee shall do all things reasonably necessary to prevent or reduce to the fullest extent scarring and erosion of the lands, pollution of the water resources and any damage to the watershed. Where construction, operation, or maintenance of any of the facilities on or connected with this lease or permit causes damage to the watershed or pollution of the water resources, the lessee or permittee agrees to repair such damage and to take such corrective measures to prevent further pollution or damage to the watershed as are deemed necessary by the authorized representative of the Secretary of Agriculture.

(4) If in the opinion of the authorized representative of the Secretary of Agriculture, the lands are valuable for watershed protection, the lessee or permittee shall provide for control of surface runoff and return the affected area to as productive condition as practicable.

(5) To pay the lessor or permitter or his tenant or the surface owner or his tenant, as the case may be, for any and all damage to or destruction of property caused by the lessee's or permittee's operations hereunder; to save and hold the lessor or permitter or the surface owner or their tenants harmless from all damage or claims for damage to persons or property resulting from the lessee's or permittee's operations under this lease or permit.

(6) To recognize existing uses and commitments, in the form of Department of Agriculture grazing, timber cutting, and special use permits, water developments, ditch, road, trail, pipeline, telephone line, and fence rights-of-way and other similar improvements, and to conduct his operations so as to interfere as little as possible with the rights and privileges granted by these permits or with other existing uses.

(7) To install and maintain cattle guards to prevent the passage of livestock in any openings made in fences by the lessee or permittee or his contractors to provide access to the lands covered by this lease or permit for automotive and other equipment.

(8) If lessee or permittee shall construct any camp on the lands, such camp shall be located at a place approved by the authorized representative of the Secretary of Agriculture, and such representative shall have authority to require that such camp be kept in a neat and sanitary condition.

(9) To comply with all federally-approved rules and regulations of the Secretary of Health, Education, and Welfare governing the emission of pollutants into the air from activities which are embraced in this lease or permit.

(10) To comply with all the rules and regulations of the Secretary of Agriculture governing the national forests or other lands under his jurisdiction which are embraced in this lease or permit.

(11) Unless otherwise authorized, prior to the beginning of operations to appoint and maintain at all times during the term of this lease or permit a local agent upon whom may be served written orders or notices respecting matters contained in this stipulation, and to inform the authorized representative of the Secretary of Agriculture, in writing, of the name and address of such agent. If a substitute agent is appointed, the lessee or permittee shall immediately so inform the said representative.

(12) To address all matters relating to this stipulation to

at

who is the authorized representative of the Secretary of Agriculture, or to such other representative as may from time to time, be designated, provided that such designation shall be in writing and be delivered to the lessee or permittee or his agent.

(Signature of Lessee)

GPO 850-292

TITLE 30—MINERAL RESOURCES

Chapter I—Geological Survey
Department of the Interior

PART 231—OPERATING REGULATIONS, TITLE 30 FOR EXPLORATION, DEVELOPMENT, AND PRODUCTION

APPENDIX 16

On March 24, 1977, the Department of the Interior published in the Federal Register a proposed regulation, operating regulations for exploration, development, and production of oil and gas on Federal lands. The proposed regulation was submitted to the Department of the Interior by the Bureau of Land Management, U.S. Department of the Interior, on March 24, 1977, for its consideration.

It is the policy of the Department of the Interior to encourage the development of oil and gas on Federal lands and to encourage the development of oil and gas on Federal lands.

It is the policy of the Department of the Interior to encourage the development of oil and gas on Federal lands and to encourage the development of oil and gas on Federal lands.

It is the policy of the Department of the Interior to encourage the development of oil and gas on Federal lands and to encourage the development of oil and gas on Federal lands.

It is the policy of the Department of the Interior to encourage the development of oil and gas on Federal lands and to encourage the development of oil and gas on Federal lands.

It is the policy of the Department of the Interior to encourage the development of oil and gas on Federal lands and to encourage the development of oil and gas on Federal lands.

It is the policy of the Department of the Interior to encourage the development of oil and gas on Federal lands and to encourage the development of oil and gas on Federal lands.

It is the policy of the Department of the Interior to encourage the development of oil and gas on Federal lands and to encourage the development of oil and gas on Federal lands.

It is the policy of the Department of the Interior to encourage the development of oil and gas on Federal lands and to encourage the development of oil and gas on Federal lands.

It is the policy of the Department of the Interior to encourage the development of oil and gas on Federal lands and to encourage the development of oil and gas on Federal lands.

It is the policy of the Department of the Interior to encourage the development of oil and gas on Federal lands and to encourage the development of oil and gas on Federal lands.

It is the policy of the Department of the Interior to encourage the development of oil and gas on Federal lands and to encourage the development of oil and gas on Federal lands.

U. S. Geological Survey - Mineral Resources, Operating Regulations for Exploration, Development and Production (Part 231, Title 30 C.F.R.)

It is the policy of the Department of the Interior to encourage the development of oil and gas on Federal lands and to encourage the development of oil and gas on Federal lands.

It is the policy of the Department of the Interior to encourage the development of oil and gas on Federal lands and to encourage the development of oil and gas on Federal lands.

It is the policy of the Department of the Interior to encourage the development of oil and gas on Federal lands and to encourage the development of oil and gas on Federal lands.

It is the policy of the Department of the Interior to encourage the development of oil and gas on Federal lands and to encourage the development of oil and gas on Federal lands.

It is the policy of the Department of the Interior to encourage the development of oil and gas on Federal lands and to encourage the development of oil and gas on Federal lands.

It is the policy of the Department of the Interior to encourage the development of oil and gas on Federal lands and to encourage the development of oil and gas on Federal lands.

It is the policy of the Department of the Interior to encourage the development of oil and gas on Federal lands and to encourage the development of oil and gas on Federal lands.

It is the policy of the Department of the Interior to encourage the development of oil and gas on Federal lands and to encourage the development of oil and gas on Federal lands.

It is the policy of the Department of the Interior to encourage the development of oil and gas on Federal lands and to encourage the development of oil and gas on Federal lands.

Title 30—MINERAL RESOURCES

Chapter II—Geological Survey, Department of the Interior

PART 231—OPERATING REGULATIONS FOR EXPLORATION, DEVELOPMENT, AND PRODUCTION

On March 24, 1971, a notice and text of a proposed revision of the mining operating regulations, governing operations conducted under mineral permits and leases on public and acquired lands of the United States and Indian lands administered by the Department of the Interior, was published in the *FEDERAL REGISTER* (36 F.R. 5510-5515) for the following purposes:

(1) To update the existing regulations by deleting obsolete provisions and including requirements consistent with modern mining practices;

(2) To add provisions for the protection of the environment during exploratory and mining operations and for reclamation of lands disturbed by such operations;

(3) To revise the procedure for appeals from decisions of the Mining Supervisors; and

(4) To delete provisions pertaining to health and safety of miners since health and safety standards for metal and non-metallic mines are now contained in 30 CFR Parts 55, 56, and 57.

Interested parties were given 60 days from the date of publication of the notice within which to submit written comments, suggestions, or objections with respect to the proposed revision. The period for submitting written comments, suggestions, or objections was subsequently extended to July 22, 1971, by a notice published in the *FEDERAL REGISTER* on June 19, 1971 (36 F.R. 11815). After consideration of the views presented, the following changes have been made in the proposed regulations:

1. In § 231.1, the term "oil shale" has been corrected to read "shale oil" when referring to the extraction of shale oil by in situ methods from oil shale.

2. Section 231.2 has been amended to eliminate the definition of "Chief, Branch of Mining Operations" and to change the definition of "Mining Supervisor." These amendments have been made to reflect the recently approved reorganization of the Conservation Division of the Geological Survey. (Departmental Manual Part 120, Chapter 4; Release No. 1373, December 8, 1971.) For the same reason, the title, "Chief, Branch of Mining Operations" has been deleted in paragraph (a) of § 231.3, and in paragraphs (c) (3) and (4) of that section, the title "Chief, Conservation Division of the Geological Survey" has been substituted for the title "Chief, Branch of Mining Operations."

3. In § 231.3, the provision in paragraph (d) authorizing the Mining Supervisor to consult with or solicit and receive advice of the Environmental Protection Agency pertaining to water pollution problems has been deleted since such

matters are more appropriately the subject of a memorandum of understanding between this Department and the Environmental Protection Agency. For the same reason, the provisions in paragraph (e) of this section and in paragraph (d) of § 231.4 with respect to consultation by the Mining Supervisor with the Environmental Protection Agency have been deleted. Paragraph (e) of § 231.3 has been amended to provide that the Mining Supervisor in addition to making inspections to determine the adequacy of water pollution control measures shall also make inspections to determine the adequacy of air pollution control measures.

4. Section 231.4 has been changed to make it clear that a lessee's or permittee's obligation, under paragraph (b), pertaining to damage to the environment, surface improvements, and other values is to "avoid, minimize or repair" such damage, and that determination made by the mining supervisor under paragraph (b) will be subject to appeal. Paragraph (c) has been amended to provide that all operations under the regulations shall be consistent with both Federal and State water and air quality standards.

5. Section 231.10(a) has been changed to require that exploration and mining plans be submitted in quintuplicate rather than in triplicate. This change is necessary to assure that the mining supervisor receives sufficient copies of the plans to permit distribution to other interested agencies.

6. In § 231.10(b), which enumerates the items which the mining supervisor may require be included in an exploration plan, the first 17 words: "Depending on the size and nature of the operations and terms and conditions of the permit . . ." have been deleted as unnecessary since the authority granted to the mining supervisor to require inclusion of the enumerated item is discretionary. For the same reason, the first 17 words, "Depending on the size and nature of the operation and the terms and conditions of the lease . . ." have been deleted from paragraph (c) of this section which enumerates the items which the mining supervisor may require be included in mining plans. Also, the title of paragraphs (b) and (c) have been changed from "Permits" and "Lease" respectively, to the more descriptive titles, "Exploration Plans" and "Mining Plans." The number of maps or aerial photographs that may be required with exploration and mining plans has been increased from two to five because of the need by the mining supervisor and other interested agencies for additional copies of these items.

7. The requirement of § 231.11 that copies of maps of underground workings and surface operations be submitted on "tracing cloth" has been changed to require that such maps be submitted on "reproducible material." Copies of maps on reproducible material will be adequate for the Mining Supervisor's needs. In the requirement that the accuracy of maps furnished to the Mining Supervi-

sor be certified "by a professional engineer, professional land surveyor, or other qualified person", the word "professionally" has been added between the words "other" and "qualified" to make it clear that the accuracy of such maps shall be certified only by those who are professionally qualified to do so.

8. The requirement of § 231.20(a) that all drill holes be logged "by competent geologists or engineers" has been changed to require that drill holes be logged "under supervision of a competent geologist or engineer." The changed requirement is considered to afford adequate protection to the United States and is consistent with present drilling practices. Section 231.20(a) also has been amended to place a limitation of 1 year on the period an operator is required to retain the core from test holes for inspection since retention for a longer period puts an unnecessary burden on the operator.

9. Section 231.20(b) has been changed to make it clear that drill holes shall be "cemented and/or cased" when abandoned, unless other methods of abandonment are approved in advance by the Mining Supervisor.

10. Section 231.20(d) has been changed to make the requirement for equipping drilling equipment with blow-out preventers when drilling on lands valuable or potentially valuable for geothermal resources applicable also when drilling on land valuable or potentially valuable for oil and gas since the danger of blowouts exists in both situations.

11. In the requirement of § 231.30 that operators observe the highest standards while conducting mining operations, the term "good practice following the highest standards" has been substituted for the term "the highest standards." Section 231.30, as originally proposed, amended former § 231.12 by substituting "highest standards" for the term "good practice." It was not the purpose of that change to place on an operator any additional obligations to those required in the former regulation. The present change is being made to make it clear that the requirement that an operator observe "good practice" means that he shall follow the highest standards prevailing in the mining industry.

12. Since pillars may not be the only acceptable method for protection of mine workings and overlying deposits, § 231.31 has been amended to authorize the Mining Supervisor to approve other methods for providing such protection.

13. Section 231.34 has been changed by adding the word "underground" in the first sentence to make it clear that this section, which provides for development of leased lands from a mine on adjoining lands, applies only to underground mines on adjoining lands and not to surface mines. The requirement of paragraph (c) for providing free access for inspection of connecting mines on privately owned or controlled lands "at all hours" has been changed to the more reasonable requirement that such access be provided at "any reasonable time."

§ 231.3 Responsibilities.

(a) Subject to the supervisory authority of the Secretary, the regulations in this part shall be administered by the Director through the Chief, Conservation Division, of the Geological Survey.

(b) The responsibility for health and safety inspections of mines subject to the regulations in this part is vested in the Bureau of Mines in accordance with section 4 of the Federal Metal and Non-metallic Mine Safety Act (80 Stat. 772, 773; 30 U.S.C. 723) and the Health and Safety Standards contained in Parts 55, 56, and 57, Chapter I, of this title.

(c) The mining supervisor, individually, or through his subordinates is empowered to regulate prospecting, exploration, testing, development, mining, and processing operations under the regulations in this part. The duties of the mining supervisor or his subordinates include the following:

(1) *Inspections; supervision of operations to prevent waste or damage.* Examine frequently leased or permit lands where operations for the discovery, testing, development, mining, or processing of minerals are conducted or are to be conducted; inspect and regulate such operations, including operations at accessory plants, for the purpose of preventing waste of mineral substances or damage to formations and deposits containing them, or damage to other formations, deposits, or nonmineral resources affected by the operations, and insuring that the terms and conditions of the permit or lease and the requirements of the exploration or mining plans are being complied with.

(2) *Compliance with regulations, lease or permit terms, and approved plans.* Require operators to conduct their operations in compliance with the provisions of applicable regulations, the terms and conditions of the leases or permits, and the requirements of approved exploration or mining plans.

(3) *Reports on condition of lands and manner of operations; recommendations for protection of property.* Make reports to the Chief, Conservation Division of the Geological Survey, as to the general condition of lands under permit or lease and the manner in which operations are being conducted and orders or instructions are being complied with, and to submit information and recommendations for protecting the minerals, the mineral-bearing formations and the non-mineral resources.

(4) *Manner and form of records, reports, and notices.* Prescribe, subject to the approval of the Chief, Conservation Division of the Geological Survey, the manner and form in which records of operations, reports, and notices shall be made.

(5) *Records of production; rentals and royalties.* Obtain and check the records of production of minerals; determine rental and royalty liability of lessees and permittees; collect and deposit rental and royalty payments; and maintain rental and royalty accounts.

(6) *Suspension of operations and production.* Act on applications for suspension

of operations or production or both filed pursuant to 43 CFR 3503.3-2(e), and terminate such suspensions which have been granted; and transmit to the Bureau of Indian Affairs for appropriate action applications for suspension of operations or production or both under leases on Indian lands.

(7) *Cessation and abandonment of operations.* Upon receipt of a report of cessation or abandonment of operations, inspect and determine whether the terms and conditions of the permit or lease and the exploration or mining plans have been complied with; and determine and report to the agency having administrative jurisdiction over the lands when the lands have been properly conditioned for abandonment. The mining supervisor, in accordance with applicable regulations, will consult with, or obtain the concurrence of, the authorized officer of the agency having administrative jurisdiction over the lands with respect to compliance by the operator with the surface protection and reclamation requirements of the lease or permit and the exploration or mining plan.

(8) *Trespass involving removal of mineral deposits.* Report to the agency having administrative jurisdiction over the lands any trespass that involves removal of mineral deposits.

(d) Prior to the approval of an exploration or mining plan, the mining supervisor shall consult with the authorized officer of the agency having administrative jurisdiction over the lands with respect to the surface protection and reclamation aspects of the plan.

(e) The mining supervisor shall inspect exploratory and mining operations to determine the adequacy of water management and pollution control measures for the protection and control of the quality of surface and ground water resources and the adequacy of emission control measures for the protection and control of air quality.

(f) The mining supervisor shall issue such orders and instructions not in conflict with the laws of the State in which the leased or permit lands are situated as necessary to assure compliance with the purposes of the regulations in this part.

§ 231.4 General obligations of lessees and permittees.

(a) Operations for the discovery, testing, development, mining, or processing of minerals shall conform to the provisions of applicable regulations, the terms and conditions of the lease or permit, the requirements of approved exploration or mining plans, and the orders and instructions issued by the mining supervisor or his subordinates under the regulations in this part. Lessees and permittees shall take precautions to prevent waste and damage to mineral-bearing formations, and shall take such steps as may be needed to prevent injury to life or health and to provide for the health and welfare of employees.

(b) Lessees and permittees shall take such action as may be needed to avoid, minimize, or repair soil erosion; pollu-

tion of air; pollution of surface or ground water; damage to vegetative growth, crops, including privately owned forage, or timber; injury or destruction of fish and wildlife and their habitat; creation of unsafe or hazardous conditions; and damage to improvements, whether owned by the United States, its permittees, licensees or lessees, or by others; and damage to recreational, scenic, historical, and ecological values of the land. The surface of leased or permit lands shall be reclaimed in accordance with the terms and conditions prescribed in the lease or permit and the provisions of the approved exploration or mining plan. Where any question arises as to the necessity for or the adequacy of an action to meet the requirements of this paragraph, the determination of the mining supervisor shall be final, subject to the right of appeal as provided in § 231.74.

(c) All operations conducted under the regulations in this part must be consistent with Federal and State water and air quality standards.

(d) When the mining supervisor determines that a water pollution problem exists, the mining supervisor may require that a lessee or permittee maintain records of the use of water, quantity and quality of waste water produced, and the quantity and quality of waste water disposal, including mine drainage discharge, process wastes and associated wastes. In order to obtain this information, the lessee or permittee may be required to install a suitable monitoring system.

(e) Full reports of accidents, inundations, or fires shall be promptly mailed to the mining supervisor by the operator or his representative. Fatal accidents, accidents threatening damage to the mine, the lands, or the deposits, or accidents which could cause water pollution shall be reported promptly to the mining supervisor by telegram or telephone. The reports required by this section shall be in addition to those required by Parts 55, 56, or 57, Chapter I of this title or other applicable regulations.

(f) Lessees and permittees shall submit the reports required by 25 CFR Part 177; Part 200 of this chapter, and 43 CFR Part 23.

§ 231.5 Public inspection of records.

Geological and geophysical interpretations, maps, and data and commercial and financial information required to be submitted under this part shall not be available for public inspection without the consent of the permittee or lessee so long as the permittee or lessee furnishing such data, or his successors or assignees, continues to hold a permit or lease of the lands involved.

MAPS AND PLANS

§ 231.10 Operating plans.

(a) *General.* Before conducting any operations under a permit or lease, the operator shall submit, in quintuplicate, to the mining supervisor for approval an exploration or mining plan which shall show in detail the proposed exploration, prospecting, testing, development, or mining operations to be conducted. Ex-

14. The requirement of § 231.34 that structures within 100 feet of a mine opening be protected against fire has been changed to add the additional requirement that they be constructed of fire resistant material. This change will add a higher degree of safety and is consistent with a similar requirement in 30 CFR Part 57.

15. Section 231.73 *Enforcement of orders*, has been rewritten to require that the Mining Supervisor serve notice on the operator before suspending operations for failure to comply with regulations, terms, and conditions of the permit or lease, the requirements of approved plans, and instructions of the Supervisor. Such advance notice, however, would not be required if the violation threaten immediate, serious or irreparable harm to the environment, mine, or other resources.

16. Section 231.74 has been changed in several respects for the purpose of clarifying the procedure for appeals from orders of the Mining Supervisor. The section has been amended to provide that appeals from a decision of the Director, Geological Survey, or the Commissioner of Indian Affairs under 30 CFR Part 231, may be taken to the Board of Land Appeals in accordance with the Department hearings and appeals procedures in 43 CFR Part 4.

Other suggestions for changes in the proposed regulations were considered but were not adopted.

Effective date. The amended regulations are hereby adopted to take effect at the beginning of the 30th calendar day following the date of publication in the *FEDERAL REGISTER*.

Dated: May 26, 1972.

W. T. PECORA,
Acting Secretary of the Interior.

ADMINISTRATION OF REGULATIONS AND DEFINITIONS

Sec.	
231.1	Scope and purpose.
231.2	Definitions.
231.3	Responsibilities.
231.4	General obligations of lessees and permittees.
231.5	Public inspection of records.

MAPS AND PLANS

231.10	Operating plans.
231.11	Maps of underground workings and surface operations and equipment.
231.12	Other maps.

BOREHOLES AND SAMPLES

231.20	Core or test hole, cores samples, cuttings, mill products.
--------	--

WELFARE AND SAFETY

231.25	Sanitary, welfare, and safety arrangements.
--------	---

MINING METHODS

231.30	Good practice to be observed.
231.31	Ultimate maximum recovery; information regarding mineral deposits.
231.32	Pillars left for support.
231.33	Boundary pillars and isolated blocks.
231.34	Development on leased tracts through adjoining mines as part of a mining unit.
231.35	Minerals soluble in water; brines; minerals taken in solution.

PROTECTION AGAINST MINE HAZARDS

Sec.	
231.40	Surface openings.
231.41	Abandonment of underground workings.
231.42	Flammable gas and dust.
231.43	Fire protection.

MILLING; WASTE FROM MINING OR MILLING

231.50	Milling.
231.51	Disposal of waste.

PRODUCTION RECORDS AND AUDIT

231.60	Books of account.
231.61	Royalty basis.
231.62	Audits.

INSPECTION, ISSUANCE OF ORDERS AND ENFORCEMENT OF ORDERS

231.70	Inspection of underground and surface conditions; surveying, estimating, and study.
231.71	Issuance of orders.
231.72	Service of notices, instructions, and orders.
231.73	Enforcement of orders.
231.74	Appeals.

AUTHORITY: The provisions of this Part 231 issued under 35 Stat. 312; 35 Stat. 781, as amended; secs. 32, 6, 26, 41 Stat. 450, 753, 1248; secs. 1, 2, 3, 44 Stat. 301, as amended; secs. 6, 3, 44 Stat. 659, 710; secs. 1, 2, 3, 44 Stat. 1057; 47 Stat. 1487; 49 Stat. 1482, 1250, 1967, 2026; 52 Stat. 347; sec. 10, 53 Stat. 1196, as amended; 56 Stat. 273; sec. 10, 61 Stat. 915; sec. 3, 63 Stat. 683; 64 Stat. 311; 25 U.S.C. 396, 396a-f, 30 U.S.C. 189, 271, 281, 293, 359. Interpret or apply secs. 5, 5, 44 Stat. 302, 1058, as amended; 58 Stat. 483-485; 5 U.S.C. 301, 16 U.S.C. 508b, 30 U.S.C. 189, 192c, 271, 281, 293, 359, 43 U.S.C. 387.

ADMINISTRATION OF REGULATIONS AND DEFINITIONS

§ 231.1 Scope and purpose.

(a) The regulations in this part shall govern operations for the discovery, testing, development, mining, and processing of potash, sodium, phosphate, sulphur, asphalt, and oil shale (except for operations for the extraction of shale oil by in situ retorting methods utilizing boreholes or wells) under leases or permits issued for public domain lands pursuant to the regulations in 43 CFR Group 3500. These regulations shall also apply to operations for the discovery, testing, development, mining, and processing of minerals (except coal, oil, and gas) in acquired lands under leases or permits issued pursuant to the regulations in 43 CFR Group 3500 and minerals (except coal, oil, and gas) in tribal and allotted Indian lands leased under the regulations in 25 CFR Parts 171, 172, 173, 174, and 176.

(b) The purpose of the regulations in this part is to promote orderly and efficient prospecting, exploration, testing, development, mining, and processing operations and production practices without waste or avoidable loss of minerals or damage to deposits; to promote the safety, health, and welfare of workmen; to encourage maximum recovery and use of all known mineral resources; to promote operating practices which will avoid, minimize, or correct damage to the environment—land, water and air—and avoid, minimize, or correct hazards to public health and

safety; and to obtain a proper record and accounting of all minerals produced.

(c) When the regulations in this part relate to matters included in the regulations in 43 CFR Part 23—Surface Exploration, Mining, and Reclamation of Lands—pertaining to public domain and acquired lands, or 25 CFR Part 177—Surface Exploration, Mining, and Reclamation of Lands—pertaining to Indian lands, the regulations in this part shall be considered as supplemental to the regulations in those parts, and the regulations in those parts shall govern to the extent of any inconsistencies.

CROSS REFERENCE: See Part 211 of this chapter for regulations governing operations under coal permits and leases. See Part 221 of this chapter for regulations governing operations under oil and gas leases and operations for the extraction of shale oil by in situ retorting or other methods utilizing boreholes or wells.

§ 231.2 Definitions.

The terms used in this part shall have the following meanings:

(a) *Secretary.* The Secretary of the Interior.

(b) *Director.* The Director of the Geological Survey, Washington, D.C.

(c) *Mining supervisor.* A registered professional engineer; the representative of the Secretary under administrative direction of the Director through the Chief, Conservation Division, and appropriate Regional Manager, Conservation Division of the Geological Survey, authorized and empowered to regulate operations and to perform other duties prescribed in the regulations in this part, or any subordinate of the Mining Supervisor acting under his direction.

(d) *Lessee.* Any person or persons, partnership, association, corporation, or municipality to whom a mineral lease is issued subject to the regulations in this part, or an assignee of such lease under an approved assignment.

(e) *Permittee.* Any person or persons, partnership, association, corporation, or municipality to whom a mineral prospecting permit is issued subject to the regulations in this part, or an assignee of such permit under an approved assignment.

(f) *Leased lands, leased premises, or leased tract.* Any lands or deposits under a mineral lease and subject to the regulations in this part.

(g) *Permit lands.* Any lands or deposit under a mineral prospecting permit and subject to the regulations in this part.

(h) *Operator.* A lessee or permittee or one conducting operations on the leased or permit lands under the authority of the lessee or permittee.

(i) *Reclamation.* The measures undertaken to bring about the necessary reconditioning or restoration of land or water that has been affected by exploration, testing, mineral development, mining, onsite processing operations, or waste disposal, in ways which will prevent or control onsite and offsite damage to the environment.

feet of consolidated sediments unless a greater depth is approved in advance by the mining supervisor.

WELFARE AND SAFETY

§ 231.25 Sanitary, welfare, and safety arrangements.

The underground and surface sanitary, welfare, health, and safety arrangements shall be in accordance with the recommendations of the U.S. Public Health Service and the applicable standards in Parts 55, 56, and 57, Chapter I of this title.

CROSS REFERENCE: For regulations of the U.S. Public Health Service, Department of Health, Education, and Welfare, see 42 CFR Chapter I.

MINING METHODS

§ 231.30 Good practice to be observed.

The operator shall observe good practice following the highest standards in prospecting, exploration, testing, development, and mining, sinking wells, shafts, and winzes, driving drifts and tunnels, stoping, blasting, transporting ore and materials, hoisting, the use of explosives, timbering, pumping, and other activities on the leased or permit lands.

§ 231.31 Ultimate maximum recovery; information regarding mineral deposits.

(a) Mining operations shall be conducted in a manner to yield the ultimate maximum recovery of the mineral deposits, consistent with the protection and use of other natural resources and the protection and preservation of the environment—land, water, and air. All shafts, main exits, and passageways, as well as overlying beds or mineral deposits that at a future date may be of economic importance, shall be protected by adequate pillars in the deposit being worked or by such other means as approved by the mining supervisor.

(b) Information obtained regarding the mineral deposit being worked and other mineral deposits on the leased or permit lands shall be fully recorded and a copy of the record furnished to the mining supervisor.

§ 231.32 Pillars left for support.

Sufficient pillars shall be left in first mining to insure the ultimate maximum recovery of mineral deposits when the time arrives for the removal of pillars. Boundary pillars shall in no case be less than 50 feet thick unless otherwise specified in writing by the mining supervisor. Boundary and other main pillars shall be mined only with the written consent or by order of the mining supervisor or his authorized subordinates.

§ 231.33 Boundary pillars and isolated blocks.

(a) If the ore on adjacent lands subject to these regulations has been worked out beyond any boundary pillar, if the water level beyond the pillar is below the lessee's adjacent operations, and if no other hazards exist, the lessee shall, on the written demand of the mining supervisor, mine out and remove all avail-

able ore in such boundary pillar, both in the lands covered by the lease and in the adjoining premises, when the mining supervisor determines that it can be mined without undue hardship to the lessee.

(b) If the mining rights in adjoining premises are privately owned or controlled, an agreement may be made with the owners of such interests for the extraction of the ore in the boundary pillars.

(c) Narrow strips of ore between leased lands and the outcrop on other lands subject to these regulations and small blocks of ore adjacent to leased lands that would otherwise be isolated or lost may be mined under the provisions specified in paragraphs (a) and (b) of this section.

§ 231.34 Development on leased tract through adjoining mines as part of a mining unit.

A lessee may mine his leased tract from an adjoining underground mine on land privately owned or controlled or from adjacent leased lands, under the following conditions:

(a) A mine that is on the land privately owned or controlled shall conform to all sections in the regulations in this part.

(b) The only connections between the mine on land privately owned or controlled and the mine on leased land shall be the main haulageways, the ventilation ways, and the escapeways. Substantial concrete frames and fireproof doors that may be closed in an emergency and opened from either side shall be installed in each such connection. Other connections through the boundary pillars shall not be made until both mines are about to be exhausted and abandoned. The mining supervisor may waive any of the requirements in this paragraph when, in his judgment, such a waiver would not conflict with the regulations in Part 57, Chapter I of this title and would not entail substantial loss of ore.

(c) Free access for inspection of said connecting mine on land privately owned or controlled shall be given at any reasonable time to the mining supervisor or other representative of the Secretary of the Interior.

(d) If a lessee operating on a lease through a mine on land privately owned or controlled does not maintain the mine in accordance with the operating regulations, operations on the leased land may be ordered stopped or departmental seals applied by the mining supervisor, and the operations on leased lands shall be stopped.

§ 231.35 Minerals soluble in water; brines; mineral taken in solution.

In mining or prospecting deposits of potassium or other minerals soluble in water, all wells, shafts, prospect holes, and other openings shall be adequately protected with neat cement or other suitable materials against the coursing or entrance of water; and the operator shall, on orders of the mining supervisor, backfill with rock or other suitable material to protect the roof from breakage when there is a danger of the entrance of water. On leased or permit lands con-

taining brines, due precaution shall be exercised to prevent the deposits becoming diluted or contaminated by the mixture of water or valueless solution. Where minerals are taken from the earth in solution, such extraction shall not be within 500 feet of the boundary line of the leased lands without the written permission of the mining supervisor.

PROTECTION AGAINST MINE HAZARDS

§ 231.40 Surface openings.

(a) The operator shall substantially fill in, fence, protect or close all surface openings, subsidence holes, surface excavations or workings which are a hazard to people or animals. Such protective measures shall be maintained in a secure condition during the term of the permit or lease. Before abandonment of operations all openings, including water discharge points, shall be closed to the satisfaction of the mining supervisor.

(b) Reclamation or protection of surface areas no longer needed for operations should commence without delay. The mining supervisor shall designate such areas where restoration or protective measures, or both, must be taken.

§ 231.41 Abandonment of underground workings.

No underground workings or part thereof shall be permanently abandoned and rendered inaccessible without the advance and written approval of the mining supervisor.

§ 231.42 Flammable gas and dust.

Mines in which flammable gas is found or explosive dust produced shall be subject to the coal-mining operating regulations in Part 211 of this chapter. An "explosive dust" is a combustible solid in airborne dispersion capable of propagating flame when ignited.

§ 231.43 Fire protection.

All structures within 100 feet of any mine opening shall be protected against fire and constructed of fire resistant material. Flammable material shall not be stored within 100 feet of a mine exit. All shafts shall be fireproof, or adequate fire-control devices, satisfactory to the mining supervisor, shall be installed. All underground offices, stations, shops, magazines, and stores shall be so constructed, equipped, and maintained as to reduce the fire hazard to a minimum. Sufficient fire-fighting apparatus shall be maintained in working condition at the mine exits and at convenient points in the mine workings for fire emergencies. An adequate water supply shall be held in storage tanks or reservoirs for fire emergencies and shall be available for immediate use through connecting pipelines for either surface or underground fires.

MILLING; WASTE FROM MINING OR MILLING

§ 231.50 Milling.

It shall be the duty of the operator to conduct milling operations pursuant to the terms of the lease, the approved mining plan, and the regulations in this part and to use due diligence in the reduction, concentration, or separation of mineral substances by mechanical or chemical

ploration and mining plans shall be consistent with and responsive to the requirements of the lease or permit for the protection of nonmineral resources and for the reclamation of the surface of the lands affected by the operations. The mining supervisor shall consult with the other agencies involved, and shall promptly approve the plans or indicate what modifications of the plans are necessary to conform to the provisions of the applicable regulations and the terms and conditions of the permit or lease. No operations shall be conducted except under an approved plan.

(b) *Exploration plans.* The mining supervisor may require that an exploration plan include any or all of the following:

(1) A description of the area within which exploration is to be conducted;

(2) Five copies of a suitable map or aerial photograph showing topographic, cultural, and drainage features;

(3) A statement of proposed exploration methods, i.e., drilling, trenching, etc., and the location of primary support roads and facilities;

(4) A description of measures to be taken to prevent or control fire, soil erosion, pollution of surface and ground water, pollution of air, damage to fish and wildlife or other natural resources, and hazards to public health and safety both during and upon abandonment of exploration activities.

(c) *Mining plans.* The mining supervisor may require that a mining plan include any or all of the following:

(1) A description of the location and area to be affected by the operations;

(2) Five copies of a suitable map, or aerial photograph showing the topography, the area covered by the permit or lease, the name and location of major topographic and cultural features, and the drainage plan away from the area affected;

(3) A statement of proposed methods of operating, including a description of the surface or underground mining methods; the proposed roads or vehicular trails; the size and location of structures and facilities to be built;

(4) An estimate of the quantity of water to be used and pollutants that are expected to enter any receiving waters;

(5) A design for the necessary impoundment, treatment or control of all runoff water and drainage from workings so as to reduce soil erosion and sedimentation and to prevent the pollution of receiving waters;

(6) A description of measures to be taken to prevent or control fire, soil erosion, pollution of surface and ground water, pollution of air, damage to fish and wildlife or other natural resources, and hazards to public health and safety;

(7) A statement of the proposed manner and time of performance of work to reclaim areas disturbed by the operations.

(d) *Revegetation; regrading; backfilling.* In those instances in which the permit or lease requires the revegetation of an area to be affected by operations the exploration or mining plan shall show:

(1) Proposed methods of preparation and fertilizing the soil prior to re-planting;

(2) Types and mixtures of shrubs, trees, or tree seedlings, grasses or legumes to be planted; and

(3) Types and methods of planting, including the amount of grasses or legumes per acre, or the number and spacing of trees, or tree seedlings, or combinations of grasses and trees.

If the permit or lease requires regrading and backfilling, the exploration or mining plan shall show the proposed methods and the timing of grading and backfilling of areas of lands affected by the operations.

(e) *Changes in plans.* Exploration and mining plans may be changed by mutual consent of the mining supervisor and the operator at any time to adjust to changed conditions or to correct an oversight. To obtain approval of a changed or supplemental plan the operator shall submit a written statement of the proposed changes or supplement and the justification for the changes proposed.

(f) *Partial plan.* If circumstances warrant, or if development of an exploration or mining plan for the entire operation is dependent upon unknown factors which cannot or will not be determined except during the progress of the operations, a partial plan may be approved and supplemented from time to time. The operator shall not, however, perform any operation except under an approved plan.

§ 231.11 Maps of underground workings and surface operations and equipment.

Maps of underground workings and surface operations shall be drawn to a scale acceptable to the mining supervisor. All maps shall be appropriately marked with reference to Government land marks or lines and elevations with reference to sea level. When required by the mining supervisor vertical projections and cross sections shall accompany plan views. Maps shall be based on accurate surveys made at least annually and as may be necessary at other times. Accurate copies of such maps on reproducible material or prints thereof shall be furnished the mining supervisor when and as required. The maps shall be posted to date and submitted to the mining supervisor at least once each year. The accuracy of maps furnished shall be certified by a professional engineer, professional land surveyor, or other professionally qualified person.

§ 231.12 Other maps.

(a) The operator shall prepare such maps of the leased lands as in the judgment of the mining supervisor are necessary to show the surface boundaries, improvements, and topography, including subsidence resulting from mining, and the geological conditions so far as determined from outcrops, drill holes, exploration or mining. All excavations in each separate bed or deposit shall be shown in such manner that the production of minerals for any royalty period can be accurately ascertained.

(b) In the event of the failure of the operator to furnish the maps required, the mining supervisor shall employ a competent mine surveyor to make a survey and maps of the mine, and the cost thereof shall be charged to and promptly paid by the operator.

(c) If any map submitted by an operator is believed to be incorrect, the mining supervisor may cause a survey to be made, and if the survey shows the map submitted by the operator to be substantially incorrect in whole or in part, the cost of making the survey and preparing the map shall be charged to and promptly paid by the operator.

BORE HOLES AND SAMPLES

§ 231.20 Core or test hole, cores, samples, cuttings, mill products.

(a) The operator shall submit promptly to the mining supervisor signed copies, in duplicate, of records of all core or test holes made on the leased or permit lands, the records to be in such form that the position and direction of the holes can be accurately located on a map. The records shall include a log of all strata penetrated and conditions encountered, such as water, quicksand, gas, or unusual conditions, and copies of analyses of all samples analyzed from strata penetrated shall be transmitted to the mining supervisor as soon as obtained or at such time as specified by the mining supervisor. All drill holes will be logged under supervision of a competent geologist or engineer, and the lessees will furnish to the mining supervisor a detailed lithologic log of each drill hole and all other in-hole surveys, such as electric logs, gamma ray neutron logs, sonic logs or any other logs produced. The core from test holes shall be retained by the operator for 1 year and shall be available for inspection at the convenience of the mining supervisor, and he shall be privileged to cut such cores and receive samples of such parts as he may deem advisable, or on request of the mining supervisor the operator shall furnish such samples of strata, drill cuttings, and mill products as may be required.

(b) Drill holes for development or holes for prospecting shall be abandoned to the satisfaction of the mining supervisor by cementing and/or casing or by other methods approved in advance by the mining supervisor and in a manner to protect the surface and not to endanger any present or future underground operation or any deposit of oil, gas, other mineral substances, or water strata.

(c) At the option of the mining supervisor or the operator drill holes may be converted to surveillance wells for the purpose of determining the effect of subsequent operations upon the quantity, quality, or pressure of ground water or mine gases.

(d) When drilling on lands valuable or potentially valuable for oil and gas or geothermal resources drilling equipment shall be equipped with blowout control devices acceptable to the mining supervisor before penetrating more than 100

processes, by distillation, by evaporation, or other means so that the percentage of salts, concentrates, oil, or other mineral substances recovered shall be in accordance with approved practices.

§ 231.51 Disposal of waste.

The operator shall dispose of all wastes resulting from the mining, reduction, concentration, or separation of mineral substances in accordance with the terms of the lease, approved mining plan, the regulations in this part, and the directions of the mining supervisor.

PRODUCTION RECORDS AND AUDIT

§ 231.60 Books of account.

Operators shall maintain books in which will be kept a correct account of all ore and rock mined, of all ore put through the mill, of all mineral products produced, and of all ore and mineral products sold and to whom sold, the weight, assay value, moisture content, base price, dates, penalties, and price received, and the percentage of the mineral products recovered and lost shall be shown.

CROSS REFERENCE: See Part 200 of this chapter for reports required to be filed and the forms to be used.

§ 231.61 Royalty basis.

The sale price basis for the determination of the rates and amount of royalty shall not be less than the highest and best obtainable market price of the ore and mineral products, at the usual and customary place of disposing of them at the time of sale, and the right is reserved to the Secretary of the Interior to determine and declare such market price, if it is deemed necessary by him to do so for the protection of the interests of the lessor.

§ 231.62 Audits.

An audit of the lessee's accounts and books may be made annually or at such other times as may be directed by the mining supervisor, by certified public accountants, and at the expense of the lessee. The lessee shall furnish free of cost duplicate copies of such annual or other audits to the mining supervisor, within 30 days after the completion of each auditing.

INSPECTION, ISSUANCE OF ORDERS, AND ENFORCEMENT OF ORDERS

§ 231.70 Inspection of underground and surface conditions; surveying, estimating, and study.

Operators shall provide means at all reasonable hours, either day or night, for the mining supervisor or his representative to inspect or investigate the underground and surface conditions; to conduct surveys; to estimate the amount of ore or mineral product mined; to study the methods of prospecting, exploration, testing, development, processing, and handling that are followed; to determine the volumes, types, and composition of wastes generated, the adequacy of measures for minimizing the amount of such wastes, and the measures for treatment and disposal of such wastes; and to de-

termine whether the terms and conditions of the permit or lease and the requirements of the exploration or mining plan have been complied with.

§ 231.71 Issuance of orders.

Before beginning operations the operator shall inform the mining supervisor in writing of the designation and post office address of the exploration or mining operation, the operator's temporary and permanent post office address, and the name and post office address of the superintendent or other agent who will be in charge of the operations and who will act as the local representative of the operator. The mining supervisor shall also be informed of each change thereafter in the address of the mine office or in the name or address of the local representative.

§ 231.72 Service of notices, instructions, and orders.

The operator shall be considered to have received all notices, instructions, and orders that are mailed to or posted at the mine or mine office, or mailed or handed to the superintendent, the mine foreman, the mine clerk, or higher officials connected with the mine, for transmittal to the operator or his local representative.

§ 231.73 Enforcement of orders.

(a) If the mining supervisor determines that an operator has failed to comply with the regulations in this part, other applicable departmental regulation, the terms and conditions of the permit or lease, the requirements of an approved exploration or mining plan, or with the mining supervisor's orders or instructions, and such noncompliance does not threaten immediate, serious, or irreparable damage to the environment, the mine or the deposit being mined, or other valuable mineral deposits or other resources, the mining supervisor shall serve a notice of noncompliance upon the operator by delivery in person to him or his agent or by certified or registered mail addressed to the operator at his last known address. Failure of the operator to take action in accordance with the notice of noncompliance shall be grounds for suspension by the mining supervisor of operations.

(b) A notice of noncompliance shall specify in what respects the operator has failed to comply with the provisions of applicable regulations, the terms and conditions of the permit or lease, the requirements of an approved exploration or mining plan or the orders and instructions of the mining supervisor, and shall specify the action which must be taken to correct the noncompliance and the time limits within which such action must be taken.

(c) If in the judgment of the mining supervisor such failure to comply with the regulations, the terms and conditions of the permit or lease, the requirements of approved exploration or mining plans, or with the mining supervisor's orders or instructions threatens immediate, serious, or irreparable damage to the en-

vironment, the mine or the deposit being mined, or other valuable mineral deposits or other resources, the mining supervisor is authorized, either in writing or orally with written confirmation, to suspend operations without prior notice.

§ 231.74 Appeals.

(a) A party adversely affected by an order of the mining supervisor made pursuant to the provisions of this part shall have a right to appeal to the Director and the further right to appeal to the Board of Land Appeals in the Office of Hearings and Appeals, Office of the Secretary, from an adverse decision of the Director, unless such decision was approved by the Secretary prior to promulgation.

(b) An appeal to the Director may be taken by filing a notice of appeal with the mining supervisor within 30 days from service of the mining supervisor's order. The notice of appeal shall incorporate or be accompanied by such written showing and argument on the facts and laws as the appellant may deem adequate to justify reversal or modification of the order. Within the same 30-day period, the appellant will be permitted to file with the mining supervisor additional statements of reasons and written arguments or briefs.

(c) The mining supervisor shall transmit the appeal and accompanying papers to the Director who will review the record and render such a decision in the case as he deems proper.

(d) Appeals to the Board of Land Appeals shall be made pursuant to procedures outlined in 43 CFR Part 4, Department Hearings and Appeals Procedures.

(e) Oral argument in any case pending before the Director will be allowed on motion in the discretion of such officer and at a time to be fixed by him.

(f) The procedure for appeals under this part shall be followed for permits and leases on Indian land except that with respect to such permits and leases, the Commissioner of Indian Affairs will exercise the functions vested in the Director. A party adversely affected by a decision of the Commissioner of Indian Affairs under this part shall have a right of appeal to the Board of Land Appeals in the Office of Hearings and Appeals, Office of the Secretary, in accordance with the procedures provided in this section.

(g) With the exception of the time fixed for filing a notice of appeal, the time for filing any document in connection with an appeal may be extended by the officer to whom the appeal is taken. A request for an extension of time must be filed within the time allowed for the filing of the document and must be filed in the same office in which the document in connection with which the extension is requested must be filed.

CROSS REFERENCE: See 43 CFR 23.12 for appeals under 43 CFR Part 23—Surface Exploration, Mining, and Reclamation of Lands. See 25 CFR 177.11 for appeals under 25 CFR Part 177—Surface Exploration, Mining, and Reclamation of Lands.

[FR Doc.72-8267 Filed 5-31-72;8:54 am]

TABLE: 4 PREVAILING WIND DIRECTION (1971)

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
1	70W	60W	72	85	45E	45W	3V	4E	8V	6W	6E	8NE
2	55W	75W	115W	75W	50W	45W	75W	5E	95E	5V	8NE	8NE
3	72E	80E	125W	10E	85W	3V	1W	75E	8E	35W	7E	75W
4	75	100	90E	85	20W	4V	20W	3E	55E	6W	7W	25W
5	5W	75	75E	7NE	85	4NE	3V	4E	35	10W	11E	80E
6	50W	1E	9W	35W	7E	8V	3V	35E	8E	5V	5NE	45E
7	8NE	1E	170W	51W	1W	3V	35E	3W	4E	3W	4W	51W
8	3W	10W	12W	10E	85W	35W	45E	3W	5V	8NE	10NE	41W
9	4W	7W	65W	8W	75W	5W	55E	3E	8NE	3E	3V	4E
10	45E	45	85W	7NE	45E	APPENDIX 17			80E	8V	100E	7E
11	2W	85E	9W	85E	4E	70W	3W	30E	5NE	3W	35W	3E
12	5W	75	5E	Table of Prevailing Wind Directions			3W	3V	35W			
13	5E	10W	90W	45W	125W	3E	4W	10E	7W	7E	9W	2E
14	7W	9W	30E	20W	75E	7W	3V	4E	7W	3E	1W	85E
15	145W	45W	10E	55E	65W	3W	4W	6W	55W	35E	40E	75W
16	7E	40E	5NE	4E	8V	3W	3V	55W	3E	45W	3W	85W
17	100W	55E	135V	8E	49E	3W	4E	35W	85E	4V	7NE	3W
18	30W	20E	7E	85	85E	3V	4E	55W	3E	8W	80E	75E
19	120W	85E	15W	35W	20W	4W	85W	85W	25E	85E	3E	3E
20	8E	30E	10W	40W	3V	3W	85E	3E	3E	8NE	3V	125W
21	6E	75	7W	85W	7E	3W	35W	7E	35E	10V	30W	3E
22	7E	10E	85W	120W	3E	50W	4E	85W	3E	4E	80W	30E
23	5W	10W	7W	12W	4E	7W	25W	55W	80E	8V	7NE	7NE
24	75W	85W	2W	91W	8E	4E	85W	45W	4E	35W	75W	4E

TABLE: 5 PREVAILING WIND DIRECTION (1971)

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG	SEPT.	OCT.	NOV.	DEC.
1	7NW	6NW	7S	6S	4SE	4SW	3V	4E	6V	6W	4V	8NE
2	5SW	7NE	11SW	7SW	5SW	4NE	7SW	5S	9SE	5V	5NE	8NE
3	12S	5NE	12SW	10N	8SW	5V	5W	2SE	5V	5SW	5N	7SW
4	7S	10S	9NW	5S	2NW	4V	2NW	2V	5SE	4W	7N	5NW
5	5W	1S	7NE	7NE	6S	4NE	5V	4V	5S	3NE	11N	4NE
6	5NW	1S	9W	12W	8S	4V	5V	5SE	8E	5V	6NE	4SE
7	5NE	1S	11NW	11NW	6SW	5V	3SE	5W	6E	5N	5NW	5SW
8	3N	18W	12W	5N	6SW	5SW	4SE	3W	5V	6NE	10NE	4NW
9	4W	7W	6SW	4W	7SW	5W	5SE	5S	6NE	5E	5V	4S
10	4SE	4S	15SW	7NE	4SE	4W	2SE	5V	4NE	4V	10NW	4S
11	2W	6SE	5W	6SE	4S	2NW	4W	4NW	5NE	6N	4SW	5S
12	5N	7S	5E	5S	10S	4V	4V	3NW	5W	5NW	5N	4SW
13	5E	16W	9SW	4SW	15SW	5V	4W	5NE	7W	7E	4W	2S
14	6W	9N	3NE	8NW	3NE	7W	5V	4E	5W	3S	1W	9SE
15	14SW	4SW	10S	5SE	6SW	5W	4W	4W	5SW	3SW	4NE	7SW
16	7N	4NE	5NE	4S	8V	5W	3V	8SW	5V	4SW	5NW	6SW
17	10NW	5SE	15N	6S	4NE	5W	4W	4SW	6SE	4V	7NE	4W
18	3NW	3SE	7E	6S	6SE	5V	4W	5SW	5S	9N	6NE	12N
19	10NW	5SE	9SW	3NW	3NW	4W	9SW	5SW	2SW	8NE	6S	9S
20	5N	8S	15W	4NW	5V	4W	5SW	2V	4S	6NE	8V	12SW
21	6S	7S	7W	8SW	7N	5W	3SW	3S	3SE	4NW	9NW	4W
22	7S	10S	6NW	12NW	4N	4NW	4S	4SW	3E	4N	6NW	9NE
23	5W	10W	7W	13W	4S	7W	2SW	5SW	6NE	5V	7NE	7NE
24	7SW	4NW	5N	9SW	6S	4W	4SW	4SW	4E	3SW	7SW	4E

TABLE: 5 PREVAILING WIND DIRECTION (1971) (cont'd)

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
25	10S	2E	9SE	6SW	7V	4V	9SW	4V	6NE	4NW	4NW	6V
26	7NW	7S	7NW	3S	4SW	5V	5SW	2E	7NE	5NW	4SE	4SW
27	11N	7W	6E	3SW	5NE	4W	5SW	2SW	5NE	4NE	7SW	4SW
28	7NW	11S	2SW	13SW	4SW	5V	4W	3SW	9NE	9NE	3V	5SW
29	4NW		10S	5SW	5W	4S	8SW	3V	8NE	5NE	7SW	4SW
30	13S		9NW	5NW	6W	4V	4S	3S	6NW	4E	7W	5SW
31	13W		7NE		5NW		4SW	5SE		4E		5W

TABLE: 5 cont. PREVAILING WIND DIRECTION (1972)

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
1	4SE	5N	9S	4N	5V	4NW	8W	2NW	4NE	6NE	4E	4SW
2	4SW	4N	12SW	9S	8V	6NE	2W	1NE	4N	11NE	0	3V
3	4SE	7S	9NW	6S	6SW	6NE	6W	1V	2NE	7E	1W	4V
4	9SW	7V	6W	7SW	5SW	6N	5W	1V	3SW	6E	0	5N
5	11NW	5N	3NW	2NW	5N	5NE	7W	1S	2SW	6NE	4NE	5SE
6	7N	9S	7NE	2SW	9SE	2SW	7W	7SW	7NE	6V	7E	5SW
7	5NW	5SW	5SW	9SW	5E	4W	4V	5N	2E	7NE	2E	7SW
8	10NE	9N	2SW	9SW	4S	3SW	7NE	3NE	4NE	6SW	7N	9SW
9	6S	8N	11N	11N	6SW	2V	7NE	1SW	4SW	4W	1E	8V
10	7SW	9N	6NW	4S	3N	2V	7NE	1SW	9N	9E	1SW	3SW
11	9SW	4N	4V	7SW	7NE	12N	5V	1V	9E	9NE	1SW	2SW
12	7SW	4S	4NE	9SW	5SE	9SE	3E	7SW	6E	7NE	1E	5NW
13	11SW	9SW	5V	7SW	10SE	5V	3SW	1SW	4V	7SW	9SE	3SE
14	6NW	6W	8SW	5SW	7SW	5V	3SW	3SE	2V	3V	10SW	4SE
15	7N	2W	7SW	9SW	8SW	5SW	4V	9SW	5SW	3NW	4N	4V
16	10NW	2SW	10SW	15SW	6N	7V	4V	11N	6V	3V	4N	7N
17	6NE	4SW	11W	7SW	5SW	9SE	8SE	7N	3V	4S	4NW	7NE
18	6NE	14W	4NW	7NE	2V	12SE	6SE	6NE	4V	4NW	8NE	3V
19	2E	15W	5S	9SE	7N	12S	9SE	4E	4V	4V	4SE	3SE
20	4S	8V	11NE	6SW	4NE	17SW	9SE	7SW	5V	10N	4W	4S
21	5SW	7S	9S	5SW	4V	9W	7NE	10S	5V	10N	1N	5V
22	2S	5SW	6W	10SW	5V	7W	6SE	10S	6E	7E	6V	4V
23	1SW	5W	7V	1E	5W	8W	4E	6W	8SE	7SE	4NE	6S
24	4SW	8W	7SW	9S	5V	8W	5S	5SW	3NE	4SW	3NE	5SW

TABLE: 5 PREVAILING WIND DIRECTION (1972) (cont'd)

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
25	3SW	7SW	10V	7V	4V	7W	7SW	7N	2SE	4NW	9S	5SW
26	7NE	10SW	5NE	7NE	4N	5NW	5SW	4SW	4E	1SE	9SW	3SW
27	2S	6N	4S	7E	5NE	4W	7SW	4N	4V	7S	4W	2SW
28	7SW	5NE	7W	7NE	5E	4W	4SW	7SW	8NE	6W	5S	5V
29	4NW	5SE	3SW	4E	6E	7SW	5SW	8SE	3SW	4W	3NE	3SW
30	7S		4S	4SE	6SW	4SW	4SW	7SE	5W	7E	1V	6SE
31	5N		3NW		10SW		9S	6S		4N		4E

TABLE: 5 cont. PREVAILING WIND DIRECTION (1973)

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
1	2SW	9S	8SE	5W	5S	5SW	9E					
2	2NE	9S	3SE	5W	3SE	5E	10V					
3	2S	15SW	7SW	6V	7SW	7SE	7E					
4	4SW	4NW	7S	6SW	4V	5S	3SW					
5	3SW	5W	6S	7NW	5NW	3S	7W					
6	10SW	4W	4V	5E	4E	4SE	3W					
7	7SW	2V	2S	10S	7SE	2SE	4W					
8	7NW	6S	5SW	9W	9S	8NE	6NW					
9	4N	7NW	2S	7SW	6SW	5SE	3V					
10	5N	6NW	3SE	12N	5SW	3SW	1W					
11	6N	5NE	11SW	7V	4SW	3SW	7SW					
12	6N	5NE	7SW	4N	8SW	3S	5W					
13	5N	5V	2V	8V	4NW	3SW	5W					
14	7V	15SW	9SW	6V	4SW	6V	4W					
15	7SW	6W	25W	9V	8NW	5V	6SW					
16	4V	5V	10SW	10S	9V	4V	6SW					
17	8NE	6NE	12W	9S	11SW	4SW	2W					
18	4S	6NE	8NW	5S	3E	2NE	6NW					
19	8SW	5NE	7V	7SE	3S	8NE	3N					
20	5NE	5V	9S	10SE	10SE	6SW	2SW					
21	10S	5N	9SW	7V	7W	6S	3S					
22	6S	6N	2SW	4E	2W	4V	6SE					
23	4NE	4SW	6NE	5S	7S	4V	6E					
24	4NW	4NW	10E	7S	5SW	2SW	7E					

TABLE: 5 PREVAILING WIND DIRECTION (1973) (cont'd)

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
25	4NE	4NE	9S	9S	7SE	2SE	4V					
26	9S	6W	15SW	7S	4SW	4SE	2V					
27	7W	7V	6NW	19SW	8SW	4NE	2V					
28	9SW	5N	2V	11NW	17SW	7V	2W					
29	9NW		4E	3SE	6SW	5SW	4NW					
30	2NE		2SE	7SE	4SW	5SW	2V					
31	4V		4S		9W		5S					

APPENDIX 18

Proposed Legislation

A B I L L

To reform the mineral leasing laws, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Act may be cited as "The Mineral Leasing Act of 1973."

DECLARATION OF POLICY

Sec. 2. It is hereby declared to be the policy of Congress--

- (a) to foster, promote, and encourage the exploration for and the production of the mineral deposits in the leasable lands;
- (b) to promote competition and discourage monopolies;
- (c) to encourage the active development of the mineral deposits in the leasable lands in a manner compatible with the use of the same lands for other purposes;
- (d) to prevent waste and promote the conservation of the mineral resources;
- (e) to encourage the maximum ultimate recovery of the mineral deposits;
- (f) to assure mineral developers adequate acreage to justify necessary plant investment, development, and production;
- (g) to require that mineral exploration and production be conducted in a manner which will prevent or substantially reduce their adverse environmental effects; and
- (h) to insure the public a fair return on the disposition of its mineral resources.

DEFINITIONS

Sec. 3. As used in this Act the term--

- (a) "Secretary" means the Secretary of the Interior;
- (b) "person" means (1) a citizen of the United States, or (2) a corporation organized under the laws of the United States or of one of the States, or the District of Columbia, or (3) an association of

such citizens or corporations or of both, but no corporation shall be a person if ten per centum or more of the stock in that corporation is held by citizens of, or corporations incorporated in, countries the laws, customs, or regulations of which deny to United States citizens or corporations equivalent rights and privileges, and no association shall be a person if ten per centum or more of the indicia of control in that association is held by citizens of, or corporations incorporated in, countries the laws, customs, or regulations of which deny to United States citizens or corporations equivalent rights and privileges;

(c) "leasable lands" means all lands owned by the United States, including mineral deposits owned by the United States in lands the surface of which is in other ownership, except (1) lands in the national park system and the national wildlife refuge system except those which on the date of enactment of this Act are open to mineral leasing, (2) lands held by the United States for the use of Indians or Indian tribes, (3) lands in naval petroleum and oil shale reserves, (4) lands on the Outer Continental Shelf, and (5) lands in the national wilderness preservation system except as otherwise provided in the Wilderness Act;

(d) "hardrock minerals" means any mineral of a kind which on January 1, 1973, was subject to location under the Mining Law of 1872 (Revised Statutes 2318-2352), as amended, and which is not subject to disposition under title II, III, or IV of this Act;

(e) "licensee" means a person who holds a prospecting license issued by the Secretary under this Act;

(f) "oil and gas" means all hydrocarbon substances except coal or oil shale;

(g) "other bedded minerals" means deposits of potentially valuable minerals occurring in beds and not in lodes, manto deposits, veins, or porphyry stocks which the Secretary determines to be more appropriately subject to disposal under Title III than under any other title of this Act;

(h) "construction minerals" means (1) all varieties of sand, stone, gravel, pumice, pumicite, cinders, and common clay, for whatever purpose they may be used, and (2) any similar minerals which are used in an unrefined condition for building, highway, or other construction and which the Secretary may designate a "construction mineral" for the purposes of this Act;

(i) "associated or related minerals" means any minerals, other than the mineral covered by the lease, which are (1) so intermingled with the deposits of the mineral for which the lease is issued that separate development is, in the opinion of the Secretary, not warranted for mining or for economic reasons, or (2) of such poor quality and in such small quantity that separate development is, in

the opinion of the Secretary, undesirable for mining or for economic reasons;

(j) "paying quantities" means that quantity of a mineral which would pay a profit to the lessee, if he operated the well or mine and marketed the product;

(k) "producing or producible lease" means a lease covering leasable land on which there are (i) one or more producing wells or mines, or (ii) a valuable leasable mineral deposit to which there is an outcrop, shaft, adit, or slope providing immediate access, or (iii) shut in wells or operational mines capable of producing the leased mineral;

(l) "maximum ultimate recovery" means the greatest quantity of the mineral deposit which can be economically recovered in accordance with the best mineral conservation and sound environmental practices;

(m) "diligent mining operations" means drilling, mining development, and mineral processing which can be expected of a lessee seriously seeking to develop a mineral deposit or, except as used in Title V, attempting to prove existence of minerals in paying quantities in the leased lands;

(n) "diligent drilling operations" means actual drilling operations which are conducted in such a way as to be an effort which one seriously looking for oil and gas could be expected to make in the particular area given existing knowledge of geologic and other pertinent factors.

(o) "underground mining operations" means those mining operations carried out beneath the surface by means of shafts, tunnels, or other underground mine openings and such use of the adjacent surface as is incidental thereto;

(p) "surface mining operations" means those mining operations carried out on the surface, including strip, area strip, contour strip or auger mining, dredging, and leaching, or any combination thereof, and activities related thereto;

(q) "open pit mining" means that surface mining method in which the overburden is removed from atop the mineral and in which, by virtue of the thickness of the deposits, mining continues in the same area proceeding predominantly downward with lateral expansion of the pit necessary to maintain slope stability and necessary to accommodate the orderly expansion of the total mining operation. For the purposes of this Act, this definition shall include caving methods and leaching activities associated with open pit mining. For the purposes of this Act, the mining of surface coal deposits, except those relating to open pit anthracite coal operations, is excluded from this definition;

(r) "reclamation" means the process of restoring a mined area affected by a mining operation to its original or other similarly appropriate condition, considering past and possible future uses of the area and the surrounding topography and taking into account environmental, economic and social conditions; and

(s) "mined area" means the surface and subsurface of leasable lands in which mining operations are being or have been conducted, including private ways and roads appurtenant to any such area, land excavations, workings, refuse banks, tailing, spoil banks, and areas in which structures, facilities, equipment, machines, tools, or other materials or property which result from or are used in, mining operations are situated.

TITLE I--General Provisions Applicable To All Titles

ISSUANCE OF PROSPECTING LICENSES

Sec. 101. (a)(1) The Secretary shall, under such regulations as he may prescribe, issue to any person a prospecting license. No person may conduct mineral prospecting for commercial purposes for any mineral on leasable lands without such a prospecting license. Each prospecting license shall be for a term of two years and shall be subject to a reasonable fee. A separate prospecting license will be required for prospecting in each State. Each prospecting license shall contain such reasonable conditions as the Secretary may require, including conditions for the protection of the environment, and shall be subject to all applicable Federal, State, and local laws and regulations. Upon violation of any such conditions or laws the Secretary may revoke the prospecting license. A prospecting license shall confer no right to a lease under this Act.

(2) A license may not cause any significant surface disturbance. He may not remove any mineral for sale but may remove a reasonable amount of minerals from the leasable lands subject to his license for analysis and study. A licensee must comply with any rules and regulations of the Federal agency having jurisdiction over the surface of the leasable lands.

(3) Any person who conducts mineral prospecting for commercial purposes on leasable lands without a prospecting license issued hereunder shall be subject to a fine of not more than \$1,000 for each day of violation.

(b) (1) Where the Secretary determines that leasable lands under his jurisdiction should be excluded from the application of this Act for purposes of providing for a higher use or for protecting or enhancing the environmental quality, the Secretary is authorized to remove such leasable lands from the application

of this Act, if they are not subject to a lease issued hereunder.

(2) Where the head of any other Federal agency determines that leasable lands the surface of which is under his jurisdiction should be excluded from the application of this Act for purposes of providing for a higher use or for protecting or enhancing the environmental quality, he shall so notify the Secretary, who shall thereupon remove those leasable lands from the application of this Act, if they are not subject to a lease issued under this Act.

ISSUANCE OF LEASES

Sec. 102. (a) Except as provided in section 106, the Secretary is authorized, under such regulations as he may prescribe, to issue to any person (1) a lease for the exploration, development, and extraction from leasable lands of (i) oil and gas under the provisions of title II of this Act, or (ii) coal (including leonardite and peat), oil shale, borates, carbonates, halides, nitrates, phosphates, silicates, and sulfates of calcium, magnesium, sodium, and potassium, elemental sulfur, or other bedded minerals under the provisions of title III of this Act; or (2) an exploration lease on leasable lands for hardrock minerals under the provisions of title V of this Act.

(b) The head of any Federal agency is authorized, under such regulations as he may prescribe, to sell, or to issue leases for the exploration, development, and extraction of, construction minerals on leasable lands the surface of which is under his jurisdiction to any person under the provisions of title IV of this Act.

(c) The United States reserves ownership of and the right to extract helium from all gas produced from leasable lands leased for oil and gas purposes.

LEASE RENTALS

Sec. 103. All leases shall be conditioned upon payment each year of an annual rental in advance. Rentals paid for any one year shall be credited against royalties accruing for that year.

INCORPORATED AREAS

Sec. 104. The provisions of this Act shall not apply to leasable lands within incorporated cities, towns, and villages, except where (1) with respect to licenses under title I and leases under title II, there has been consultation with the local government, and (2) with

respect to leases and sales under titles III, IV, and V, there has been consent by the local government.

COMPETITIVE BIDDING

Sec. 105. (a) If the Secretary or any other head of a Federal agency shall determine to issue a lease or contract under section 102, he shall, except as provided in sections 105(b), 402, and 403, issue that lease or contract through competitive bidding after formal advertising and such other public notice as the Secretary or other head of a Federal agency may prescribe. The Secretary shall reserve the right to reject all bids whenever in his judgment the best interest of the United States will be served by so doing.

(b) If the Secretary shall determine to issue an exploration lease for minerals subject to title V, he shall issue that lease without competitive bidding only to the first qualified applicant under such rules and regulations as the Secretary may prescribe, except that the Secretary shall issue, only by competitive bidding under section 105(a), an exploration lease for any lands as to which he determines there is geological, geophysical or geochemical evidence of the existence of such minerals in paying quantities. Where two or more persons file applications for lease on the same day covering the same lands under title V, they shall be deemed to have filed their applications simultaneously. In such case the Secretary shall require that the lease be issued to the highest qualified bidder among those persons as determined by competitive bidding.

(c) Leases and contracts may be offered for competitive bidding on the initiative of the Secretary or on his approval of an application therefor.

CONSENT OF OTHER FEDERAL AGENCIES

Sec. 106. Leases covering leasable lands the surface of which is under the jurisdiction of any Federal agency other than the Department of the Interior may be issued only upon consent of that other Federal agency and upon such conditions as it may prescribe with respect to the use and protection of the nonmineral interest in those leasable lands.

MULTIPLE LEASES

Sec. 107. The issuance of a lease for a particular mineral shall not preclude the issuance of leases covering other minerals

in the same leasable lands, where the Secretary considers that they are separately mineable or extractable and that operations with respect to such minerals will not unreasonably interfere with the lessee who has prior rights.

ASSOCIATED OR RELATED MINERAL DEPOSITS

Sec. 108. Where leasable lands contain, in addition to a deposit of a mineral for which a lease has been issued, associated or related minerals, the Secretary may allow or, where economically feasible in his judgment, require the lessee to extract and dispose of such associated or related minerals if they are not subject to a lease issued to a different lessee upon payment of such royalty as the Secretary may prescribe for each type of associated or related mineral.

ENVIRONMENTAL PROTECTION AND CONSERVATION

Sec. 109. (a) Prior to taking any action on leasable lands pursuant to this Act which might cause a significant disturbance of the environment, the lessee shall have obtained the Secretary's approval of an operation and reclamation plan describing the manner in which his activity will be conducted and showing that such activity will be conducted in a manner consistent with environmental regulations issued by the Secretary. As promptly as possible after the lessee submits a plan, the Secretary shall approve or disapprove the plan or require that it be modified. Where the land involved is under the surface jurisdiction of another Federal agency, that other agency must consent to the terms of such approval: Provided, that the Secretary shall delegate authority to the Secretary of Agriculture to approve or disapprove operation and reclamation plans involving lands in the National Forest System, and the Secretary of Agriculture shall consult with the Secretary of the Interior with respect to significant technical and geological questions and special exploration and development systems.

(b) Pursuant to section 124, the Secretary shall issue environmental regulations which shall--

(1) contain requirements designed to insure that the operation of the lease (i) will not result in a violation of applicable water or air quality standards, (ii) will control or prevent erosion or flooding, release of toxic substances, accidental subsidence of land or rock slides, underground, outcrop or refuse bank fires, damage to fish or wildlife or their habitat or to public or private property, waste of mineral resources, and hazards to

public health and safety, and (iii) if the surface has been disposed of with a reservation of all or any minerals to the United States, will be in conformance with any State land use plans;

(2) require that the area be reclaimed, that a reclamation plan be prepared and approved in advance of initiation, significant change or continuance of operations, and that reclamation work be made an integral part of the operation and be completed in accordance with any applicable performance standards within reasonably prescribed time limits;

(3) provide for filing, updating, and permanent retention of engineering maps of all active surface and underground operations for which engineering or other maps are available;

(4) be developed with full participation of all interested Federal departments and agencies, State agencies, local governments, and other interested bodies and groups;

(5) be compatible with, and assure at least the same degree of environmental protection and reclamation as is required by, any State law or regulatory program of the State in which the lands are located; and

(6) be regularly reviewed and updated with public notice and an opportunity for public participation.

(c) The regulations issued or revised under this section shall be applicable to all leases issued pursuant to this Act, irrespective of whether a lease was issued prior to the issuance or revision of such regulations.

(d) The Secretary shall by regulation adopt performance standards for the reclamation of mined areas affected by surface mining operations. Those performance standards shall include specifications that will ensure (i) that mined areas will be returned, as soon as feasible, to their original contour or to a contour similarly appropriate considering the surrounding topography and possible future uses of the area, (ii) that there will be no desposition of spoil material, except as necessary to the original excavation of earth in a new mining operation, on the undisturbed or natural surface within or adjacent to the mined area, and that reclamation will be conducted concurrently with the mining operation, except that the Secretary may allow departures from these specifications where the operator demonstrates that such departures will provide equal or better protection of life, property, and environmental quality or where the Secretary determines in individual cases, in order to encourage the reclamation of previously mined areas that the cost of reclamation on a previously mined area in strict compliance with these specifications is impracticable, and that the environmental quality of the entire mined area would on balance be clearly enhanced, (iii) that throughout the mined

area, soil conditions will be stabilized and water management will be conducted such that landslides are prevented, erosion is minimized, and water pollution by siltation and by acid, highly mineralized or toxic material drainage is minimized, and (iv) that the original type or similarly appropriate type of vegetation will be re-established on the area disturbed by the mining operations as soon after the soil handling is completed as feasible. He shall revise all such performance standards periodically as necessary.

(e) The Secretary shall by regulation adopt performance standards for the reclamation of areas affected by open pit mining, taking into consideration the unique nature of such operations. Those performance standards shall ensure (i) that new mined areas shall be returned, to the extent feasible, to approximately their original contour or to a contour similarly appropriate considering the surrounding topography and possible future uses of the area, (ii) that, to the extent feasible, there is no permanent deposition of spoil material on undisturbed or natural surfaces within or adjacent to the mined area, (iii) that, throughout the permit area, soil conditions will be stabilized and water management conducted, such that landslides are prevented, erosion is minimized, and pollution of water, including that in water impoundments created by the mining operation, by siltation and by acid, highly mineralized and toxic material drainage is minimized, and (iv) that to the extent feasible, original type or similarly appropriate type vegetation will be re-established on the disturbed land areas. He shall revise all such performance standards periodically as necessary.

(f) The Secretary shall by regulation adopt performance standards for reclamation of areas affected by underground mining operations in order to prevent, minimize or correct environmental harm, including standards for minimizing subsidence and the continuing discharge of acid, mineralized and toxic material drainage. He shall revise all such performance standards periodically as necessary.

(g) To advise the Secretary in developing regulations under this section, there is established an advisory committee composed of representatives of the Departments of Agriculture and Commerce, and the Environmental Protection Agency, and such other representatives as the Secretary may designate.

(h) The Secretary may delegate to the land administering agency, the authority to enforce the regulations issued under this section: Provided, that the Secretary shall delegate such authority to the Secretary of Agriculture with respect to lands in the National Forest System.

BONDS

Sec. 110. (a) The Secretary, or the Secretary of Agriculture in the case of operations in the National Forest System, may require a bond to enforce any of the requirements of this Act or regulations issued hereunder.

(b) The Secretary shall require posting of performance bonds in amounts at all times sufficient to insure reclamation in the event that the regulations are not complied with or that reclamation is not completed in accordance with the reclamation plan.

PENALTIES

Sec. 111. (a)(1) If any person fails to comply with any regulations issued under this Act for a period of fifteen days after receiving notice to correct such failure, the Secretary may order cessation of such person's operations and such person shall be liable for a civil penalty of not more than \$1,000 for each day of continuance of such failure after said fifteen days.

(2) If any person knowingly violates any regulation issued pursuant to this Act, he shall, upon conviction, be punished by a fine not exceeding \$10,000 or by imprisonment not exceeding one year, or both. The penalties prescribed in this section shall be in addition to any other remedies afforded by this Act or by any other law or regulation.

(b) At the request of the Secretary, the Attorney General may institute a civil action in a district court of the United States or the highest court in a United States territory for an injunction or other appropriate order (1) to prevent any lessee from engaging in operations in violation of regulations issued under this Act; (2) to prevent any lessee from placing in commerce the minerals produced in violation of such regulations; (3) to enforce a warrant issued under section 124, or (4) to collect a penalty under this section. The district court of the United States for the district in which such person resides or is doing business shall have jurisdiction to issue such injunction or order.

SURFACE LEASES

Sec. 112. (a) The lessee shall have, under his lease, the right to use, free of charge, so much of the surface of the leased area as may be reasonably required for the actual extraction

and removal of the mineral subject to his lease. The lessee shall also, upon payment of fair market rental and upon such terms and conditions as the Secretary may prescribe, have the right to a lease for the amount of the surface reasonably necessary for other operations under the lease and access thereto of (1) the leased area, and (2) where the leased area is inadequate, nearby leasable lands. Where the surface of the area to be covered by the surface lease is under the jurisdiction of any Federal agency other than the Department of the Interior such lease may be issued only upon such terms and conditions as that other Federal agency may prescribe with respect to the use and protection of the nonmineral interests in such area.

(b) The Secretary may delegate to the land administering agency the authority to enforce the conditions of the surface lease issued under this section: Provided, that the Secretary shall delegate such authority to the Secretary of Agriculture with respect to lands in the National Forest System.

LIMITATIONS ON LEASE AND OPTION ACREAGE

Sec. 113. (a) Subject to approval by the Secretary, a lessee who combines his interest with those of another lessee in order to construct mills and beneficiation plants or to carry on the business of a refinery for their joint use or to establish and construct as a common carrier a pipeline or railroad to transport oil and gas from their several wells or minerals from their several mines, or from those of other lessees, shall not, as a result of such action, be charged under section 201, 301, or 501 with any acreage embraced in that other lessee's lease.

(b) No person shall be charged with a pro rata share of any acreage holdings of any association or corporation unless he is the beneficial owner of more than 10 per centum of the stock or other indicia of ownership or control of that association or corporation.

(c) Any leases or interests in leases acquired by descent, will or judgment in excess of the prescribed limitations may be held for not more than two years after acquisition. Excess acreage acquired as the result of corporate mergers may be held for not more than six months.

ASSIGNMENTS OF LEASE AND EXTENSIONS OF LEASES

Sec. 114. (a) Any lease issued under this Act may be assigned, subject to final approval of the Secretary, as to all or part of the acreage included therein and as to either a divided or undivided interest therein, to any person qualified to hold a lease under this

Act: Provided, that a nonproducing oil and gas lease may not be assigned in tracts of less than six hundred and forty acres except where such a lease contains less than six hundred and forty acres and, in that event, the lease may be assigned only in its entirety. The Secretary will approve an assignment of separate zones or deposits under a lease, or of a part of a smallest legal subdivision, only when he considers such an assignment to be in the interest of conservation.

(b) Any lease assigned in whole shall be taken subject to any approved existing plan of operation or reclamation, and any lease assigned in part shall be taken subject to all applicable portions of such a plan.

(c) An assignment of part of the acreage subject to a lease or of separate zones shall segregate the assigned and retained portions into separate leases and such segregated leases shall continue for the term of the original lease.

(d) Upon segregation by assignment of a producing or producible lease, or of a lease held beyond its initial term by payment of compensatory royalty, the segregated lease of an undeveloped assigned or retained part shall continue for the primary term of the original lease, but for not less than two years and so long thereafter as the conditions established for extension of a lease beyond the primary term in the title under which the lease was issued are met.

SUSPENSION, WAIVER, OR REDUCTIONS OF RENTS OR ROYALTIES

Sec. 115. (a) The Secretary, for the purpose of encouraging the maximum ultimate recovery of leasable minerals or in the interest of conservation of natural resources or to protect the environment or upon recommendation of the Secretary of Agriculture with respect to National Forest System lands, may suspend operations or production, or both on any lease. He may suspend, waive, or reduce the rental or minimum royalty, or reduce the royalty on an entire leasehold, or on any tract or portion thereof segregated for royalty purposes, wherever, in his judgment, it is necessary to do so in order to promote development or the leases cannot be successfully operated under the terms provided therein.

(b) In the event the Secretary shall direct the suspension of operations or production, or both, under any lease granted under this Act, any payment of rental or of minimum royalty prescribed by that lease shall be likewise suspended during such period of suspension of operation or production, or both, and the term of such lease shall be extended by adding any such suspension period thereto.

RIGHT TO WATER ON LEASABLE LANDS

Sec. 116. Upon application by a lessee, the Secretary shall grant the lessee a right to drill for, produce and use so much water subject to Federal ownership, appropriation, or utilization on lands subject to his lease as may be needed in connection with activities under his lease except where the Secretary determines that the lessee's production and use of such water would adversely affect the existing rights of other water users or have a significant adverse environmental impact.

SURRENDER, CANCELLATION, AND TERMINATION OF LEASES

Sec. 117. (a) Any lease issued under this Act may be surrendered at any time, but such a surrender will not relieve the lessee of any liability which has accrued under the lease prior to the surrender or entitle the lessee to the return of any rental or other moneys already paid.

(b) Except as provided in section 118, in the event of a breach of any of the terms and conditions of any lease or the regulations issued under this Act, that lease shall be subject to cancellation by the Secretary after thirty days notice to the lessee and failure of the lessee to correct the condition giving rise to the breach, in accordance with regulations promulgated by the Secretary.

(c) Any person involved in, or made a party to, such an administrative action shall have the right to a prompt dismissal upon showing that he holds and acquired, as a bona fide purchaser for value, the interest involving him as a party. No hearing as to such a showing shall be held unless the Secretary presents prima facie evidence of a violation of this Act on the part of the alleged bona fide purchaser.

TERMINATION OF LEASE FOR DEFAULT IN PAYMENT OF RENTAL: REINSTATEMENT

Sec. 118. (a) Upon failure of a lessee to pay the rental due on or before the anniversary date of a lease which is not a producing or producible lease, the lease shall terminate by operation of law.

(b) Where the rental is paid or is tendered within twenty days after the due date, the lessee may, within that period, file with the Secretary a petition for reinstatement of the lease. If it is shown to the satisfaction of the Secretary that the default in payment of the rental was not due to a lack of reasonable diligence on the lessee's part, and if no valid lease covering the same land has been

issued prior to the filing of the petition, the Secretary may reinstate the lease upon such terms and conditions as he may prescribe. Upon reinstatement of a lease, the Secretary may extend it for a period of time not in excess of that between the date of termination and the date of reinstatement, if he deems such an extension justifiable.

(c) If rental in a deficient amount was paid on time and the deficiency is nominal as determined by the Secretary in regulations, or if the rental was calculated in accordance with the acreage figure in the lease and that figure is found to be incorrect, the lease shall not terminate automatically. The Secretary shall notify the lessee of the deficiency and require payment within the period prescribed by him. Upon failure of the lessee to pay the deficiency within the time allowed, the lease shall be deemed terminated and shall not be subject to reinstatement.

DISPOSITION OF RECEIPTS

Sec. 119. (a) All receipts derived from leases issued under titles II, III, and V shall be paid into the Treasury of the United States. Thirty-seven and one-half per centum of such receipts (or 90 per centum of receipts from leases in Alaska) shall be paid by the Secretary of the Treasury as soon as practicable after December 31 and June 30 of each year to the State in which the leased lands are located. The balance of $62\frac{1}{2}$ per centum of such receipts (or 10 per centum of receipts from Alaska) shall be credited to miscellaneous receipts.

(b) All receipts derived from the disposition of minerals under title IV shall be disposed of in a manner similar to that of proceeds received from the sale of public lands.

(c) This section shall not apply to proceeds from leases and rights-of-way covering lands acquired under Acts providing for specific disposition of proceeds therefrom; proceeds from such leases shall be disposed of in accordance with these statutes.

UNITIZATION

Sec. 120. (a) Leases issued under this Act may, in the interest of conservation or in the public interest, be made subject to unitized exploration, development, and production under regulations issued by the Secretary. These regulations may provide that (1) leases subject to a unit plan will be relieved from acreage limitations, (2) production or discovery on any lease in a unit will be construed as production or discovery on all leases in that unit, (3) leases included in a unit plan will be subject to extension for the life of the unit, (4) a lease, upon exclusion from a unit, may be extended for two years and so long

thereafter as it is a producing or producible lease or until the termination date in the lease, whichever is later, and (5) leases issued under other statutes may be included with the consent of all lessees, in such unit plans and, if so included, shall be subject to the provisions of this section.

(b) By regulation the Secretary may require a lessee under this Act to enter a unit plan under this section and may provide for the determination of participating acreage within a unit and require the payment of minimum royalty on only that portion of a lease within the participating acreage while all other portions of the lease are subject to rental.

(c) Any unit plan authorized by the Secretary shall contain a provision whereby authority is vested in the Secretary to set, alter, or modify from time to time the rate of prospecting and development and quantity and rate of production under that unit plan.

UNLAWFUL TRUSTS: FORFEITURE

Sec. 121. Except as otherwise provided in this Act, if any lands or deposits subject to the provisions of this Act shall be subleased, trusted, possessed, or controlled by any device permanently, temporarily, directly, indirectly, tacitly, or in any manner whatsoever, so that they form a part of or are in anywise controlled by any combination in the form of an unlawful trust, with the consent of the lessee or optionee, or form the subject of any contract or conspiracy in restraint of trade in the mining or selling of any leasable mineral entered into by the lessee or optionee or any agreement or understanding, written, verbal, or otherwise, to which such lessee or optionee shall be a party, of which his or its output is to be or become the subject, to control the price or prices thereof or of any holding of such lands by any individual, partnership, association, corporation, or control in excess of the amounts of lands provided in this Act, the lease, option, or permit shall be forfeited by appropriate court proceedings.

RIGHTS-OF-WAY FOR PIPELINES

Sec. 122. Rights-of-way over, upon or through all leasable lands and naval petroleum and oil shale reserves may be granted, issued or renewed by the Secretary (and, where the surface of the lands is administered by another Federal agency with the consent of the head of that agency) for pipeline purposes for the transportation of oil or natural gas and storage facilities in connection therewith to any person. Such rights-of-way shall extend to (a) the lands occupied by the pipeline and its appurtenances, including but not limited to the line of pipe, valves, pump stations, supporting

structures (including terms), monitoring devices, surge and storage tanks, and terminals; (b) the lands occupied by facilities necessary for the operation or maintenance of the pipeline and its appurtenances; and (c) such adjacent lands as are necessary to provide for access, operation, maintenance or public safety. From time-to-time, the Secretary may issue such permits for temporary use of public lands in the vicinity of the pipeline and its appurtenances and facilities, as may be appropriate to enable the grantee to construct, operate, maintain, or terminate the pipeline and its appurtenances and facilities, or to gain access thereto. Rights-of-way and permits shall be subject to such regulations and terms and conditions as the Secretary may prescribe regarding extent, duration, application, charges, survey, location, construction, operation, maintenance and use.

Such pipelines and terminals shall be constructed, operated, and maintained as common carriers, and shall accept, convey, transport, or purchase, without discrimination, oil or natural gas produced from leasable lands in the vicinity of the pipeline as determined by the Secretary in such proportionate amounts as the Secretary may, after a full hearing with due notice thereof to the interested parties and a proper finding of facts, determine to be reasonable. However, the common carrier provisions of this section shall not apply to any natural gas pipeline operated by any person subject to regulation under the Natural Gas Act, 52 Stat. 821, as amended, or by any public utility subject to regulation by a State or municipal regulatory agency having jurisdiction to regulate the rates and charges for the sale of natural gas to consumers within the State or municipality. The Secretary shall provide in every lease subject to Title II of this Act that the lessee, if owner or operator of any pipeline which may be operated in an area accessible to lands under leases issued under Title II, shall at reasonable rates and without discrimination accept and convey the oil and gas produced under such leases in such accessible areas.

The Secretary, prior to granting, issuing, or renewing a right-of-way pursuant to this section which may have a significant impact on the environment, shall require the applicant to submit a plan of construction, operation, and rehabilitation which shall comply with regulations issued by the Secretary designed to insure that the use of the right-of-way will have the minimum adverse impact on the environment. The Secretary shall issue regulations which shall include, but shall not be limited to: requirements to insure that activities in connection with the right-of-way will not violate applicable air and water quality standards; and requirements to control or prevent (1) damage to the environment (including damage to fish and wildlife habitat), (2) damage to public or private property, and (3) hazards to public health and safety. Such regulations shall be regularly revised. The issuance or revision of such regulations shall be applicable to every right-of-way granted, issued or renewed pursuant to this section, irrespective of whether that right-of-way was granted, issued or renewed prior

to the issuance or revision of such regulations. Failure to comply with the provisions of this section or the regulations and conditions prescribed by the Secretary shall be grounds for forfeiture of the grant by the United States district court for the district in which the property, or some part thereof, is located in an appropriate proceeding.

REPEAL OF EXISTING LAWS

Sec. 123. (a) Except to the extent necessary to preserve leases, permits, claims, and other valid existing rights under the following statutes, and to authorize the Secretary to take such actions (including the issuance of new regulations) as may be needed in the continued Federal administration of those leases, permits, claims, and other valid existing rights, the following statutes are repealed:

(1) the Mineral Leasing Act of February 25, 1920, as amended and supplemented (30 U.S.C. 181-263), except that nothing in this Act shall affect the authority of the Secretary of the Navy with respect to lands within the naval petroleum or oil shale reserves;

(2) the Potash Leasing Act of 1927 (30 U.S.C. 281-287);

(3) the Sulphur Leasing Act of April 17, 1926, as amended (30 U.S.C. 271-276);

(4) the Mineral Leasing Act for Acquired Lands (30 U.S.C. 351-359);

(5) the Railroad and Other Rights-of-Way Leasing Act of May 31, 1930 (30 U.S.C. 301-306); and

(6) the mining Law of 1872, as amended and supplemented and related Acts (30 U.S.C. chapters 2, 12A, and 16, and sections 161 and 162).

(b) Except to the extent necessary to preserve valid existing rights under the following statute, and to authorize the Secretary to take such actions (including the issuance of new regulations) as may be needed in the continued Federal administration of those valid existing rights, the Materials Act of July 31, 1947, as amended (30 U.S.C. 601-604), is further amended in the following respects:

(1) by the deletion from the first sentence of section 1 (30 U.S.C. 601) of the words "mineral materials (including but not limited to common varieties of the following: sand, stone, gravel, pumice, pumicite, cinders, and clay)" and, of the words

"mineral or," and of the words "and the United States mining laws."; and

(2) by the deletion from the first sentence of section 4 (30 U.S.C. 604) of the words "sand, stone, gravel, and."

(c) Except to the extent necessary to preserve valid existing rights, any provision in any other statute which provides for the disposition of a mineral subject to this Act is hereby repealed or modified to the extent necessary to conform to this Act, except that nothing in this Act shall be deemed to modify or amend the Territorial Submerged Lands Act of 1963 (48 U.S.C. 1701-1704), and nothing in this Act shall prohibit the disposal by the General Services Administration of minerals as part of a full fee title to property covered by the Federal Property and Administrative Services Act of 1949 (40 U.S.C. 471-535).

(d) Any rights or claims derived from any of the laws or provisions hereby repealed or modified which existed on the date of enactment of this Act shall not be affected thereby, but shall remain subject to the provisions of the laws under which such rights were derived, except that any mining claims under the Mining Law of 1872, as amended (Revised Statutes 2318-2352), must be recorded with the Secretary within one year after the effective date of this Act. Any mining claim not so recorded shall be conclusively presumed to be abandoned and shall be void. Such recordation will not render valid any claim which was not valid on the effective date of this Act, or which becomes invalid thereafter.

(e) Any claim recorded pursuant to subsection (d), for which the claimant has not made application for a patent within three years from the date of recordation, shall be presumed to be invalid unless the claimant presents to the Secretary clear evidence of its validity.

REGULATIONS

Sec. 124. (a) The Secretary is authorized to issue and revise as appropriate such regulations as he finds necessary or desirable to carry out the provisions and purposes of this Act.

(b) The Secretary is authorized to make such inspections and investigations as he considers necessary or appropriate to develop or enforce Federal regulations, or otherwise to carry out the purposes of this Act, and for such purposes authorized representatives of the Secretary shall have the right of entry to any area covered by any lease. In order to enforce the right of entry into a specific area the Secretary may obtain a warrant from the appropriate district court to authorize such entry.

TITLE II--Oil and Gas

ACREAGE LIMITATIONS: MAXIMUM LEASE AREAS

Sec. 201. (a) Not more than two hundred and forty-six thousand and eighty acres may be held or controlled under oil and gas leases and options by a person in any one State. The maximum area which may be included in any one oil and gas lease issued under this Act is two thousand five hundred and sixty acres.

(b) The acreage limitation prescribed in paragraph (a) shall not affect the right of any person to continue to hold or control in the State of Alaska oil and gas leases and options not exceeding in total six hundred thousand acres which are in effect at the time of enactment of this Act. However, any surrender, termination, or assignment of a lease covering land in Alaska in excess of two hundred and forty-six thousand and eighty acres shall not authorize the person which surrendered or assigned the lease or which held or controlled the lease at the time of termination, to hold or control other leased acreage in substitution for the acreage subject to the surrendered, terminated, or assigned lease.

ANNUAL RENTALS, ROYALTIES; LEASE TERMS

Sec. 202. (a) An oil and gas lease issued under this Act shall be for a term of five years and so long thereafter as it is a producing or producible lease. Any lease maintained in accordance with applicable statutory and regulatory requirements, covering land on which, or for which under an approved cooperative or unit plan of development or operations, diligent drilling operations are commenced prior to the end of its primary or an extended term and are being prosecuted at that time shall be extended for two years and so long thereafter as it is a producing or producible lease. Unless the lease is a producing or producible lease at the end of the tenth year after its effective date, it shall terminate automatically by operation of law.

(b) The Secretary shall, by regulation, prescribe annual rentals on leases which shall not be less than \$1 per acre or fraction thereof. The leases shall require payment of a royalty of not less than 12½ per centum in amount or value of production, as determined by the Secretary. A minimum royalty, to be established by the Secretary at a rate of not less than \$2 per acre, shall be payable in lieu of rental at the expiration of each lease year beginning after the lease becomes a producing or producible lease.

(c) Rental and royalty rates and other terms and conditions of a lease shall be subject to readjustment by the Secretary twenty

years after the issuance of the lease and at the conclusion of each ten-year period thereafter.

COMMUNITIZATION AND DEVELOPMENT CONTRACTS

Sec. 203. (a) When separate tracts cannot be independently developed and operated in conformity with a well-spacing or development program for oil and gas, established by the Secretary or adopted by him, any lease for oil and gas (or a portion thereof), issued under this Act, may be pooled with other lands, whether or not owned by the United States, under a communitization or drilling agreement providing for an apportionment of production or royalties among the separate tracts of land comprising the drilling or spacing unit when determined by the Secretary to be in the public interest, and operations or production pursuant to such an agreement shall be deemed to be operations or production as to each such lease committed thereto.

(b) The Secretary is authorized, on such conditions as he may prescribe, to approve operating, drilling, or development contracts made by one or more lessees of oil and gas, with one or more persons whenever, in his discretion, the conservation of natural products or the public convenience or necessity may require it or the interests of the United States may be best served thereby. The Secretary may provide by regulation that all leases operated under such approved operating, drilling, or development contracts, and interests thereunder, shall be excepted in determining holdings under the provisions of this Act.

STORAGE OF OIL AND GAS

Sec. 204. With the consent of the Federal agency with jurisdiction over the surface of leasable lands where applicable, the Secretary, to avoid waste or to promote conservation of natural resources, may authorize the subsurface storage of oil or gas, whether or not produced from federally owned lands, in lands leased or subject to lease under this Act. Such authorization may provide for the payment of a storage fee or rental on such stored oil or gas or, in lieu of such fee or rental, for royalty other than that prescribed in the lease when such stored oil or gas is produced in conjunction with oil or gas not previously produced. Any lease on which storage is so authorized shall be extended at least for the period of storage and so long thereafter as oil or gas not previously produced is produced in paying quantities.

DRAINAGE AGREEMENTS; EXTENSION OF LEASE TERM

Sec. 205. (a) Whenever it appears to the Secretary that leasable lands not subject to an oil and gas lease are being drained of oil and gas by wells on adjacent lands he may negotiate agreements with the owners or operators of such wells to compensate the United States for such drainage: Provided, however, that such agreements may be negotiated only when it appears that the unleased lands cannot or should not be independently leased and developed.

(b) Whenever it appears to the Secretary that leasable lands under lease are being drained of oil or gas by wells on adjacent land, he shall require either that the lessee drill and produce all wells necessary to protect the leased lands from such drainage where economically feasible or that the lessee pay as compensatory royalty such amount as the Secretary in his discretion taking into account economic feasibility may determine sufficient to compensate the United States for such loss.

(c) The term of any lease for which compensatory royalty is paid shall not expire during the period in which such royalty is paid, and for a period of one year from discontinuance of such payment and so long thereafter as oil or gas may be produced in paying quantities.

TITLE III--Coal (Including Leonardite and Peat); Oil Shale; Borates, Carbonates, Halides, Nitrates, Phosphates, Silicates, and Sulfates of Calcium, Magnesium, Sodium, and Potassium: Elemental Sulfur: and Other Bedded Minerals

ACREAGE LIMITATIONS; MAXIMUM LEASE AREAS

Sec. 301. (a) The maximum acreage that may be held or controlled directly or indirectly by a person in any one State under lease, and option, is forty-six thousand and eighty acres for coal, fifteen thousand three hundred and sixty acres for sodium, twenty-five thousand six hundred acres for potassium, five thousand one hundred and twenty acres for sulfur, ten thousand two hundred and forty acres for oil shale, and twenty thousand four hundred and eighty acres for all other leasable minerals subject to this title. Not more than twenty thousand four hundred and eighty acres may be held or controlled, directly or indirectly, under phosphate lease, and option, in the entire United States.

(b) The maximum area which may be included in a single lease is five thousand one hundred and twenty acres for coal and oil shale

and two thousand five hundred and sixty acres for any other mineral subject to this title.

TERMS OF LEASES

Sec. 302. (a) A lease for a mineral subject to this title shall be for a term of twenty years and for so long thereafter as that mineral is produced annually in paying quantities from that lease or from one or more leases in an approved logical mining unit in which that lease is included. The Secretary shall, by regulation, prescribe annual rentals on leases of not less than \$1 per acre or fraction thereof. A lease shall require payment of a royalty in such amount as the Secretary shall determine. The lease shall include such other terms and conditions as the Secretary shall determine. Such rents, royalties, and other terms and conditions of the lease will be subject to readjustment at the end of its primary term of twenty years and at the end of each ten-year period thereafter if the lease is extended by production or if it is renewed as provided in section 303.

(b) The lessee shall be obligated to commence and to conduct diligent mining operations on one or more of his leases grouped in an approved logical mining unit within the time specified by the Secretary upon the approval of the plan of operations.

(c) Where diligent mining operations are prevented by strikes or other circumstances neither caused by nor attributable to the lessee, the Secretary may, if in his judgment the public interest will be served thereby, provide in the lease for payment in advance of a minimum royalty in lieu of continuous operations under the lease.

RENEWAL OF LEASES

Sec. 303. (a) In the absence of extension by production of a lease issued pursuant to title III of this Act and, if compliance is made with all of the terms and conditions of the lease, and unless otherwise prescribed by law, the lease may be renewed after its primary term on such terms and conditions as may be prescribed by the Secretary for additional ten year periods and so long as there is annual production in paying quantities from at least one lease in an approved mining unit grouping of leases, or diligent mining operations or other such productive mining work is performed thereon acceptable to the Secretary.

(b) As a condition precedent to renewal, the Secretary may, in his discretion, readjust the terms and conditions, including rental and royalty rates, and impose such covenants and conditions in the renewal lease as he may deem reasonably necessary.

TITLE IV--Construction Minerals

DISPOSAL OF CONSTRUCTION MINERALS

Sec. 401. Except as to leasable lands within the definition of property in section 3(d) of the Federal Property and Administrative Services Act of 1949 (40 U.S.C. 472) the head of any Federal agency with surface jurisdiction of leasable lands is authorized, under such regulations as he may prescribe, to issue leases for the exploration, development, and production, or contracts for the sale, at fair market value, of construction minerals in the leasable lands under his jurisdiction if such leasing or sale is not expressly prohibited by other laws of the United States, and is not detrimental to the public interest. The rental on any lease shall not be less than \$1 per acre or fraction thereof. All leases and, except as provided in section 403, all contracts for sales shall be granted to the highest responsible qualified bidder, under general regulations issued by the Secretary.

FREE USE PERMITS

Sec. 402. The head of any Federal agency, in his discretion, may issue a permit to any other Federal agency or any State, or agency or subdivision of a State, or any other nonprofit association or corporation to develop and produce, without charge, construction minerals for other than industrial or commercial use or purposes of resale from leasable lands the surface of which is under his jurisdiction.

NEGOTIATED SALES; REPORTS TO CONGRESS

Sec. 403. (a) The head of any Federal agency may authorize the negotiation of a contract for the disposal of construction minerals, from leasable lands under his jurisdiction, (i) if the minerals are to be used in a public works program on behalf of a Federal, State, or local agency and the public exigencies will not allow the delay incident to advertising; and (ii) if the disposal involves a mineral deposit for which no competitive interest is shown.

(b) The head of any Federal agency shall report to the Congress on January 1 and July 1 of each year the number of negotiated sales, the names of the purchasers, the appraised value of the construction minerals, the amount of the contract, and the bases upon which the determination was made to enter into a negotiated contract rather than after competitive bidding.

TITLE V--Hard Rock Minerals

ACREAGE LIMITATIONS; MAXIMUM LEASE AREAS

Sec. 501. Not more than twenty thousand four hundred and eighty acres may be held or controlled under hard rock mineral leases by a person in any one State. The maximum area which may be included in any one hard rock mineral lease is six hundred and forty acres.

LEASE TERMS

Sec. 502. (a) A hard rock mineral exploration lease shall be issued for a period of ten years and shall grant an exclusive right to explore for all hard rock minerals in the land subject to the lease. The lease will be subject to an annual rental of not less than 50 cents per acre or fraction thereof and such other conditions as the Secretary may prescribe.

(b) At any time before the end of the ten-year period a production lease shall be issued to the exploration lessee, if he shows, to the satisfaction of the Secretary, that he has discovered on the leased lands minerals in paying quantities. A production lease will grant the exclusive right to produce and develop only those hard rock minerals which the lessee discovered in paying quantities under the exploration lease. If the production lessee discovers on the land subject to his lease other hard rock minerals, his lease shall, upon his application, be revised to include those additional minerals. A production lease will be subject to an annual rental of not less than \$2 per acre or fraction thereof and such royalty and other conditions as the Secretary may prescribe. The production lease will be for a period of twenty years and as long thereafter as the lessee conducts diligent mining operations on lands subject to the lease or on other lands subject to a production lease embraced in the same logical mining unit, as approved by the Secretary. All terms and conditions of a production lease will be subject to readjustment at the end of twenty years and at the end of each ten-year period thereafter.

(c) If, at the end of twenty years after the issuance of the production lease, there is no production under the lease or any other production lease in the same approved logical mining unit, it will automatically terminate unless the lessee shall show, to the satisfaction of the Secretary, that the deposits subject to his production lease contain minerals in such quantity and quality as to justify retention for commercial development and production. Upon such a showing the Secretary is authorized to renew the production in paying quantities and upon such rental, royalty, and

other conditions as he may prescribe. If, at the end of ten years, there is no production on a production lease renewed under this subsection or on another production lease in the same approved logical mining unit, the production lease shall terminate and shall not be subject to renewal.

(d) Where diligent mining operations are prevented by strikes or other circumstances neither caused by nor attributable to the lessee, the Secretary may, if in his judgment the public interest will be served thereby, provide in the lease for payment in advance of a minimum royalty in lieu of continuous operations under the lease.

(e) In no lease issued under this title shall the royalty required be less than 3 per centum of the gross value, as determined by the Secretary, of all commercial production under the lease at the point of shipment to market.

(f) The Secretary may permit any requirement for production under this section to be satisfied by payment of minimum royalty, at a rate to be set by him, for five years or such longer period as he may authorize.

Bureau of Land Management
Library
Bldg. 50, Denver Federal Center
Denver, CO 80225

Form 1279-3
(June 1984)

BORROWER

TD 195 .P45 082 1974

Phosphate Leasing on
Osceola National For

DATE LOANED	BORROWER

USDI - ELM

